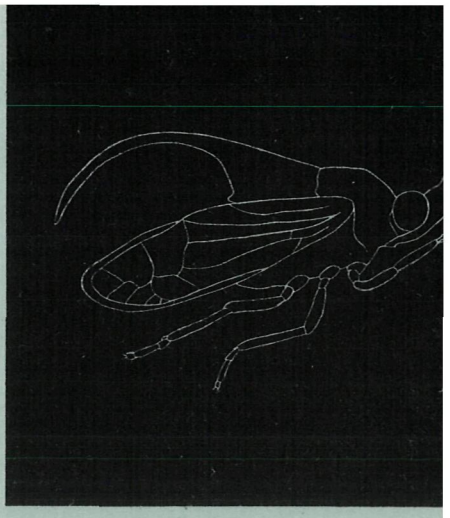

PACIFIC INSECTS

MONOGRAPH 5

A review of the Machaerotidae
(Hemiptera : Cercopoidea)

By T. C. Maa

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2. J. L. Gressitt: Problems in the zoogeography of Pacific and Antarctic insects. With appendices by T. C. Maa, I. M. Mackerras, S. Nakata and L. W. Quate. Pp. 1–127, 45 figs. 1961. $ 2.50 bound; $ 2.00 unbound.

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A REVIEW OF THE MACHAEROTIDAE

(Hemiptera: Cercopoidea)[1]

By T. C. Maa[2]

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Abstract: This paper is based upon examination of about 1200 specimens from 34 different collections, including types or paratypes of F. Walker, Stål, Spångberg, Signoret, Kirkaldy, Distant, E. Schmidt, Melichar, Baker, Hacker, Lallemand, Jacobi and Kato. The family is here divided into 2 subfamilies, 4 tribes and 27 genera. The genera *Trigonurella*, *Labrosyne*, *Aecalus*, *Blastocaena*, *Romachaeta* and *Tapinacaena* and the subgenus *Platycotta* are described as new, whereas the published generic names *Aphromachaerota*, *Trichophyes*, *Neurohindola*, *Metahindola*, *Promaxudea*, *Eumachaerota* and *Asichaerota* are, for the first time, reduced to synonyms and *Parahindoloides*, *Pseudomachaerota* and *Strandiana* are moved from Machaerotidae to other groups. Altogether 107 species are considered distinct, including 31 new ones and a number of new synonyms and new combinations. All the taxa are characterized or re-characterized wherever material is available. Four cases of stylopization are recorded. Lectotypes are designated for some of E. Schmidt's and Baker's species.

INTRODUCTION

The Machaerotidae (Hemiptera: Homoptera: Cercopoidea) comprise a small, distinct and interesting group of insects mainly inhabiting the Old World tropics. The adult often has a long, free and spine-like process originating at the scutellum and is thus superficially similar to the Membracidae. Its tegmen or forewing, like typical bugs of the Suborder Heteroptera, always has a distinct, membranous apical area. The nymph constructs a calcareous tube on some woody dicotyledons and immerses itself in a rather clear fluid excretion inside the tube. The tube strongly simulates the shell of certain serpulid sea-worms or helicoid land-snails and contains no less than 75 % calcium carbonate. This fascinating habit is quite uncommon in the Class Insecta and markedly different from that of typical cercopids or spittle-bugs which make and live in a froth mass either subterranean or above-ground.

This family has been little collected and studied and is generally rare in collections. Most of the described species are known from only one or two specimens. A few species have been recorded as infesting certain economic plants but they are unlikely to be pests of any significant importance.

The present paper represents an attempt to suggest a new classificatory system of this group, to review the published genera and species and to add some apparently new ones.

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1. Partial result of the program "Zoogeography and evolution of Pacific insects", supported in part by a grant from the U. S. National Science Foundation.

2. Maa Tsing-chao.

About 1200 specimens from 34 different museums and collections have been studied; and the types or paratypes left by F. Walker (1851, 1858, 1868), Stål (1854, 1855, 1865), Spångberg (1877), Signoret (1879), Westwood (1886), Kirkaldy (1906, 1913), Distant (1907, 1916), E. Schmidt (1907), Melichar (1915), Baker (1919, 1927), Hacker (1926), Lallemand (1927, 1942, 1951), Jacobi (1928) and Kato (1928, 1929, 1933) have been re-examined or compared with fresh material. The family is here divided into 2 subfamilies, 4 tribes, 27 genera and subgenera and 107 species. The paper by no means pretends to be complete as a few of the forms described are unknown to me and many more are expected to be added.

The terminology used in the paper is modified from Linnavuori.[3] For brevity and convenience, but not always in a morphological sense, some extensions of his system are made. The vertex is here subdivided into the ocellar area, side pieces and supra-antennal triangles. The last, when well defined, are separated from the side pieces by a transverse carina. The tylus represents the dorsal or superior surface of the postclypeus and is sometimes delimited from the face by a transverse carina too. Unless otherwise stated, the carinae and rugae (or wrinkles), respectively, refer to longitudinal carinae and transverse rugae, and the body length includes the closed tegmina. The other terms are self-explanatory in fig. 1.

The relative lengths of the head, pronotum and scutellum are measured separately along the median longitudinal line, each viewed vertically to its plane. The breadth is measured along a hypothetical straight line crossing the broadest part. That of the head includes the eyes. The depth of the scutellum in profile (of Machaerotinae) is measured along a straight line drawn from the base of the basilateral depression of scutellar process to the lateroventral margin of the scutellum and tangent to the bottom of the postero-inferior marginal concavity (fig. 1). All relative measurements, unless otherwise stated, are in the scale 65 units=4 mm. Since these bugs are more or less humpbacked and only limited sampling was made, it must be admitted that the measurements, particularly lengths of head and pronotum, are no more than approximately correct. The general shape of the head and the details of the ♂ genitalia are represented by figures, instead of verbal descriptions. The keys are based upon external macroscopic characters only, although in some cases, the internal or microscopic characters may be more distinctive. Species unknown to me are each marked with an asterisk (*) at the heading and in the key.

The names of zoogeographic subregions are after Bartholomev, Eagle Clarke and Grimshaw's Atlas of Zoogeography (Bartholomev's Physical Atlas, vol. 5, 1911), but their "Indo-Malayan" subregion is here divided, by the Wallace's Line (as modified by Dickerson *et al.*, 1928), into Malaysian and Philippine subregions, and their "Austro-Malayan" subregion, into Wallacea and Papuan subregions. Under the heading "Material examined," distributional records which appeared in my earlier papers are not repeated here. The bibliography for the different taxa includes only more important entries, since Metcalf (1960) has catalogued them (unfortunately with a number of mistakes in synonymy and distributional records) up to the end of the year 1955. The terminology of type designations of genera is after Cook (1914). Abbreviations used in the text to indicate place of deposit of specimens and in the citation for location of type specimens, are as follows:

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3. Linnavuori, R. 1959. Ann. Zool. Soc. Zool. Bot. Fenn. "Vanamo" **20** (1): 1-370, 144 figs. (Ref. pp. 2-8, figs. 1-3).

AM	Australian Museum, Sydney
AMNH	American Museum of Natural History, New York
BISHOP	Bernice P. Bishop Museum, Honolulu
BNN	Museum Alexander König, Bonn
BKK	Agricultural Experiment Station, Bangkhen near Bangkok
BMNH	British Museum (Natural History), London
BRN	Moravské Museum v Brne, Brno
BRX	Institut Royal des Sciences Naturelles de Belgique, Bruxelles
CAS	California Academy of Sciences, San Francisco
CCT	Zoological Survey of India, Calcutta
CJD	Carl J. Drake Collection, now in the U. S. National Museum
CM	Chicago Natural History Museum, Chicago
ANIC (CSIRO)	Australian National Insect Collection (Commonwealth Scientific and Industrial Research Organization, Canberra)
DDN	Museum für Tierkunde, Dresden
DHD	Forest Research Institute, Dehra Dun, U. P.
GNV	Museum Civico di Storia Naturale, Genova
HLD	Agrarisch Proefstation, Hollandia, W. New Guinea
HSPA	Hawaiian Sugar Planters' Association Experiment Station, Honolulu
KU	Entomological Laboratory, Kyushu University, Fukuoka
LDN	Rijksmuseum van Natuurlijke Historie, Leiden
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts
MKT	Masayo Kato Collection, Tokyo
MNL	Bureau of Plant Industry, Manila
NMV	National Museum of Victoria, Melbourne
OXF	Hope Department of Entomology, Oxford University, Oxford
PARIS	Muséum National d'Histoire Naturelle, Paris
PMB	Department of Agriculture, Stock and Fisheries, Port Moresby
PTR	Transvaal Museum, Pretoria
QM	Queensland Museum, Brisbane
SAM	South Australian Museum, Adelaide
SHH	Musée Heude, Shanghai
SPR	Entomological Institute, Hokkaido University, Sapporo
STK	Naturhistoriska Riksmuseum, Stockholm
TARI	Taiwan Agricultural Research Institute, Taipei
TCM	T. C. Maa Collection, Taipei
TVR	Musée Royal de l'Afrique Centrale (=Musée du Congo Belge), Tervuren
USNM	U. S. National Museum, Smithsonian Institute, Washington, D. C.
WN	Naturhistorisches Museum, Wien
WSW	Institut Zoologique, Académie Polonaise des Sciences, Warszawa
ZMB	Zoologisches Museum, Humboldt Universität, Berlin

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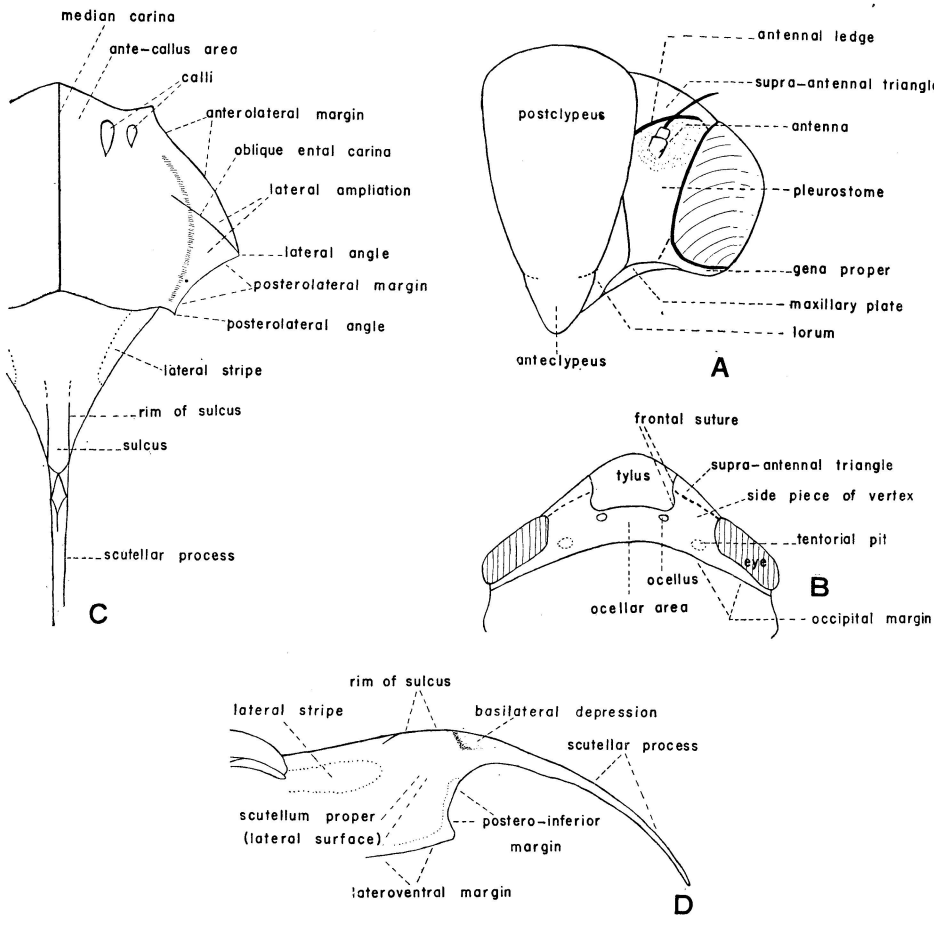

Fig. 1. Diagrams showing terminology used in the paper. A, head, front view; B, head and part of pronotum, dorsal view; C, pronotum and scutellum, dorsal view; D, scutellum in profile.

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HISTORICAL SKETCH

The history of the systematics of Machaerotidae is rather short and simple. The more important events are:

1835 Burmeister described *Machaerota ensifera*, the first known genus and species of this family.

1858 Stål named this group as subfamily Machaerotida.

1862 Stål described *Carystus* (=*Hindola*), the first known genus of Enderleiniinae (=Hindolinae).

1884 Ratte ably described and finely illustrated 3 types of nymphs and nymphal "shells" (calcareous tubes) of some "*Aphrophora*" species infesting *Eucalyptus* trees in SE Australia and found the shells composed of no less than 75% calcium carbonate.

1907 E. Schmidt published the first and only World monograph of "Machaerotinae", divided them into 4 tribes (Enderleiniini, Maxudeini, Sigmasomini [sic], Machaerotini), 8 genera and 17 species and put all of them in keys.

1907 Kirkaldy presented a key to the 3 Australian genera.

1912 Lallemand, basing his work mainly upon that of E. Schmidt, briefly described and keyed the 11 genera of "Machaerotinae" then known, and listed the 23 species belonging to them. Besides these, he placed the genus *Hindola* and its 11 species under Aphrophorinae.

1915 Distant described *Hindoloides*, the first known genus of Hindoloidini.

1919 Baker revised the Malaysian and Philippine Machaerotinae, and presented keys to 4 genera and 12 species.

1927 Baker raised this group to family-rank, divided it into 3 subfamilies (Hindoliinae, Maxudeinae, Machaerotinae), and presented keys to the 4 families of Cercopoidea, to the subfamilies and tribes of Machaerotidae, to the 10 genera of "Hindoliinae" [sic] and to the 4 Malaysian and Philippine species of *Conmachaerota*.

1942 Matsumura presented a key to the 7 genera of Japan and Taiwan.

1947 Maa revised the 13 Chinese species (6 genera) and presented keys to the 5 and 9 Oriental genera of Hindolini and Machaerotini, respectively.

1956 Maa presented a key to the 9 Philippine species (3 genera) of Machaerotidae.

1960 Metcalf, basing upon literature up to end of 1955, fully catalogued the family. Totally 3 subfamilies, 5 tribes, 31 genera (incl. *Strandiana*, *Pseudomachaerota* and *Parahindoloides*), 104 species and 10 varieties were recognized as distinct. [In the present paper, these 31 genera and 104 species are reduced to 21 genera and 76 species].

By a mere glance over published papers of this family, one will soon be impressed by the following facts:

(1) The scantiness of material available to earlier authors: For instance, E. Schmidt's monograph (17 species included) was based upon only 5 ♂♂ and 16 ♀♀. On the other hand, most of the "old" species are known from single specimens.

(2) The superabundance of haplotypic generic names: Of the 41 published generic names (here reduced to 21, plus 7 new genera and subgenera), only *Carystus*, *Pachymachaerota*, *Conmachaerota* and *Soa* were erected upon more than 1 species each. This is

largely because some authors held a view that structural differences were for genera and higher categories and that color and dimensional differences alone were good enough for the recognition of species.

(3) The lack of interest by earlier authors in reviewing "old" names: Type specimens left by earlier authors have been almost entirely overlooked by later workers. Type specimens of only 2 old species (*Machaerota ensifera* Burmeister and *M. pugionata* Stål) had ever been re-examined. Of the 58 taxonomic papers listed at the end of the present paper, only 5 have synoptic keys to species.

(4) The negligence by earlier authors of certain structural characters: For instance, the sexual dimorphism (other than color and dimension) and the effect of stylopization have never been noticed; the ♂ genitalia have been described and/or figured for only 3 species (*Pectinariophyes hyalinipennis* Stål, *Machaerota coomani* Lallemand and *M. ensifera* Burm.).

It is needless to add that not all such discrepancies and negligence are fully rectified in the present paper. Further reductions and revisions of the old names will be necessary when more material and knowledge about this group is available. The internal anatomy of both adult and immature stages, the physiology and biochemistry of the nymphal calcareous secretion and the like are entirely unknown. The complete life history has been worked out to some detail in only 2 species (*Makiptyelus dimorphus* Maki and *Machaerota spangbergii* Signoret). In short, much more work needs to be done on this interesting group.

SYSTEMATIC ACCOUNT

Family MACHAEROTIDAE (Stål)

Machaerotida Stål 1858: 233; Machaerotina Stål 1870: 727; Machaerotinae E. Schmidt 1907: 165; Machaerotidae Baker 1927: 530.

Body rather stout; dorsum more or less convex, never strongly flattened. Head usually short, never much broader than anterior end of pronotum; postclypeus swollen at upper portion; gena clearly divided into gena proper and pleurostome by a short longitudinal suture. Pronotum large, usually about 1/2 broader than long, more or less broader than head, very seldom as broad as head (when much broader than head, then lateral angle strongly ampliate but never broadly rounded); anterior pronotal margin between eyes usually strongly arcuate or subangulate, never straight; median carina often present. Scutellum as long as or longer than pronotum, either simply long and acuminate as in Clastopterinae, or strongly elevated and produced caudad into a free spine-like process simulating pronotal process of Membracidae. Tegmen 2–3.5× as long as wide, distinctly divided into corium, clavus and membrane (here termed corial appendix) by claval furrow and apical transverse fold; corium usually with simple, rather regularly arranged venation, very seldom reticulate in apical 1/2 or 2/3, but never reticulate only at extreme apex as in certain Cercopidae and never with a costal plica as in certain Clastopterinae; ambient vein always present; corial appendix membranous, veinless; clavus with 1 simple or apically branched longitudinal vein, or with 2 longitudinal veins which are adnate or joined by a short crossvein near middle, but never (except in *Labrosyne*) with 2 simple and independent longitudinal veins as in Cercopidae. Wing with simple, rather uniform venation, longitudinal vein 1

simple; 3 and 5 often apically branched. Hind tibia with or without 1 or 2 lateral spines. Abdomen short, tergites more or less strongly telescoped; abdominal apex distinctly upturned. Male genitalia: aedeagus always simple and bilaterally compressed; periandrium partially developed; paramere short, narrow, slender, slightly expanded apically; subgenital plate thin, flat, continuous with sternite 9; sclerites around anus much smaller than in Cercopidae; pygofer always with a granulose or spiny area at each side below base of anal segment.

RANGE: Old World tropics, chiefly inhabiting rain forests, a few species spread into temperate zones (E. Manchuria, Korea, S. Japan, Tasmania), a few others found in lowland open forests. Not found in Polynesia, Micronesia, SW Asia and Africa north of Sahara. Two subfamilies, 4 tribes, 27 genera and 107 species.

The Superfamily Cercopoidea is here divided into 2 families, Cercopidae and Machaerotidae. The former includes the subfamilies Aphrophorinae, Cercopinae and Clastopterinae. The family Machaerotidae stands closer to Clastopterinae than to the 2 other subfamilies and is chiefly characterized by the simple tegminal and wing venation and ♂ genitalia. Macroscopically, it can be easily distinguished from most of the Cercopidae by the long scutellum and rather heavy body.

The 2 subfamilies of Machaerotidae can be immediately separated by the absence and presence of a free, spine-like scutellar process. Their differences in detail are tabulated below:

ENDERLEINIINAE	MACHAEROTINAE
Head never broader than anterior end of pronotum.	Head somewhat broader than anterior end of pronotum.
Supra-antennal triangle often clearly defined.	Supra-antennal triangle never clearly defined.
Pronotum with 6 or 8 indistinct calli.	Pronotum with 4 distinct calli.
Lateral margin of pronotum never strongly reflexed; anterolateral margin often much shorter than posterolateral margin.	Lateral margin of pronotum often strongly reflexed; anterolateral margin longer than or nearly as long as posterolateral margin.
Lateral and posterolateral angles of pronotum always rounded and not produced.	Lateral and posterolateral angles of pronotum often angulate and ampliate.
Scutellum almost always flattened and with no distinct lateral surfaces, never with free spine-like process.	Posterior portion of scutellum more or less elevated, always sharply divided into dorsal (sulcus area) and lateral surfaces and with a free spine-like process.
Mesonotal process broadly rounded, not produced caudad.	Mesonotal process pointed, strongly produced caudad.
Tegmen short, broad, opaque to transparent, often heavily punctate; apical margin nearly perpendicular to claval furrow; venation varying, occasionally strongly reticulate; apical cells, when definable, almost in a transverse series; subcosta strongly curved, usually far from costal margin, always forming a strong, tooth-	Tegmen long, narrow, always transparent, almost always smooth; apical margin strongly oblique to claval furrow; venation uniform, never strongly reticulate; apical cells almost in a longitudinal series; subcosta straight, concave, always very close to costal margin, never projected tooth-like at underside.

like projection at underside.

Corial appendix of tegmen varying in size, shape and extent, from smaller than claval appendix to nearly 1/2 as large as corium.

Claval veins of tegmen varying, often 2, adnate or joined by a crossvein at middle, and both branched or unbranched apically.

Wing, when closed, often reaching tegminal apex; anal lobe large; longitudinal veins 3 and 5 always branched apically.

Hind tibia with 1–2 lateral spines.

Inner and outer apical lobes of hind tarsomeres almost always equally long.

Abdominal segments strongly telescoped; ♀ ovipositor-sheath vertical or nearly so; ♂ anal segment partially subdivided into 2 rings.

Aedeagus (♂) strongly narrowed apicad.

Granulose or spinose area of ♂ pygofer several times as long as broad.

Nymphal tube spiral-shaped or subconic.

Corial appendix always longly triangular and several times as long as claval appendix.

Claval vein always 1, apically branched or unbranched.

Wing never reaching tegminal apex; anal lobe small; longitudinal veins 3 and 5 seldom branched.

Hind tibia with 1 or no lateral spine.

Inner apical lobes of hind tarsomeres almost always longer than outer apical lobes.

Abdominal segments moderately telescoped; ♀ ovipositor-sheath directed dorso-caudad; ♂ anal segment simple.

Aedeagus (♂) virtually evenly broad.

Granulose or spinose area of ♂ pygofer usually roundish.

Nymphal tube straight, subcylindric.

Subfamily ENDERLEINIINAE (E. Schmidt)

Enderleiniini E. Schmt. 1907: 167; Hindoliinae [sic] Baker 1927: 531.

Characters as in the above tabulation.

RANGE: Same as family; 2 tribes, 18 genera, 53 species. The genera *Pseudomachaerota* Melichar 1915 (orthotype: *Ps. olivacea* Mel. 1915, fig. 24P) of Madagascar and S. Africa; *Parahindoloides* Lallemand 1951 (haplotype: *P. lumuana* Lall. 1951, fig. 24D) of Borneo; and *Strandiana* Lallemand 1936 (orthotype: *Hindola longipennis* Lall. 1924) of New Caledonia were originally assigned to this subfamily, but examinations of their type species reveal that they clearly belong to true Cercopidae and are therefore not included here. In correspondence, Dr. Lallemand mentioned that *Beesoniella* Lall. 1933 (haplotype: *B. sylvestris* Lall. 1933) of N. India might also belong here, but a study of the type species (♂♀) disproves this suggestion.

The more important generic characters of this subfamily are the shape of the head, relative length of the anterolateral pronotal margin, convexity or concavity of the scutellum and details of the tegminal venation. The last character has been over-emphasized by some earlier authors, but it is somewhat variable in certain forms and is hard to recognize in forms with non-transparent tegmen. The probable interrelationship of the genera is shown in figs. 33–34.

KEY TO TRIBES AND GENERA OF ENDERLEINIINAE

1. Tegmina in repose apically bent across abdominal apex behind clavus, and

there overlapping one another and forming a large oblique areole to cover abdominal apex; clavus apically broad and obliquely subtruncate, its marginal or ambient vein abruptly curved forward before meeting claval furrow; corial appendix never smaller than total area of apical cells (Tribe Hindoloidini) 2

Tegmina in repose never overlapping one another beyond clavus (at most with corial appendices quite narrowly overlapping), never forming a large areole to cover abdominal apex; clavus apically narrowly acute its marginal vein apically straight or nearly so, forming a narrow acute angle with claval furrow; corial appendix never more than 1/3 of total area of apical cells (Tribe Enderleiniini) 6

2 (1). Corial appendix subtriangular, not reaching tegminal apex, its anterior end acute; head scarcely narrower than pronotum; anterolateral pronotal margin nearly as long as interocellar distance; postclypeus broadly longitudinally depressed below center; tegmen heavily sclerotized, not transparent 3

Corial appendix subrectangular, reaching tegminal apex, its anterior end broader than posterior end; head much narrower than pronotum; anterolateral pronotal margin at least 2 or 3× as long as interocellar distance; postclypeus evenly convex, not longitudinally depressed 4

3 (2). [Pronotum and anterior 3/5 of scutellum with a narrow, very high median carina; body mat, densely covered with silvery recumbent hairs; clavus with 2 strong independent longitudinal veins, lacking crossvein; corium with a triangular membraneous plication on costal margin at point of apical 1/3; longitudinal veins 3 and 5 of wing apically unbranched. (Belonging to Cercopidae, Clastopterinae, not Machaerotidae; included here to avoid possible confusion) ..... **Parahindoloides**]

Pronotum and scutellum lacking median carina; body smooth and shining, with no distinct hairs; clavus with rather weak apically branched longitudinal vein; corium lacking such plication; longitudinal veins 3 and 5 of wing apically branched ..... **Trigonurella**

4 (2). Tegmen not transparent, veins poorly definable; scutellum evenly horizontal in profile, sharply pointed at apex, with dorsolateral marginal carina not exposed when tegmen closed; tegmen apically with 3–4 cells, veins M and Cu adnate for some distance near middle, Cu apically weakly convergent to claval furrow ..... **Hindoloides**

Tegmen transparent, veins prominent and deeply pigmented; scutellum distinctly elevated for greater part, dorsolateral marginal carina in profile well exposed above closed tegmen; scutellar apex not sharply pointed but distinctly foveate or depressed 5

5 (4). Corium apically with 6 cells arranged in 2 series, veins M and Cu entirely coalescent before reaching preapical cell 3, Cu not touching claval furrow; claval veins adnate for some distance at middle, vein 1 apically simple and not tumescent; extreme apex of scutellum distinctly recurved... **Aphrosiphon**

Corium apically with 3 cells arranged in 1 series, veins M and Cu independent of each other, meeting only at a point near base, Cu preapically touching claval furrow for some distance and apically strongly divergent to that

furrow; claval veins joined by a short crossvein near middle, vein 1 apically branched and tumescent; extreme apex of scutellum not recurved ..... **Soamachaerota**

6 (1). Tegmen transparent, venation strongly reticulate, veins quite prominent, deeply pigmented; scutellum proper about 1/2 as deep as long in profile, its dorsal surface quite narrow and linear, lateral surface extensive and strongly descending; body very large and robust, about 9–11 mm long, 4–5 mm broad and high ..... **Apomachaerota**

Tegmen and scutellum not as above, the former either transparent but lacking reticulate venation, or non-transparent and with poorly developed and pigmented veins; scutellum proper usually linear in profile, but when seldom about 1/2 as deep as long (in *Enderleinia*), then broadly, quite deeply excavated along median line; body either smaller or less robust 7

7 (6). Cubital vein of tegmen strongly curved, touching claval furrow for some distance; tegminal veins always prominent, cells always concave and transparent; head always much narrower than pronotum. Oriental forms 8

Cubitus straight or nearly so, subparallel to and far from claval furrow, never touching the latter; tegminal veins and cells and head variable 10

8 (7). Corium of tegmen with only 2 closed cells (1 preapical and 1 apical); claval vein single, branched near base and at apex; scutellum with a shallow ditch ..... **Neuroleinia**

Corium with 6–8 closed cells (2–3 preapicals, 3 apicals plus few marginals); 2 claval veins (the 1st of which unbranched at apex), adnate for some distance or joined by a crossvein near middle; scutellum either flat or with a deep ditch 9

9 (8). Claval veins adnate for some distance near middle, vein 1 strongly bullate near apex; crossveins separating preapical and apical cells not continuous with one another; Cu divergent at both ends from claval furrow; scutellum nearly flat ..... **Serreia**

Claval veins joined by a crossvein near middle, vein 1 not bullate near apex; crossveins separating preapical and apical cells joining together to form a nearly straight line; apical 1/2 of Cu entirely in contact with claval furrow; scutellum with a deep and rimmed ditch ..... **Machaeropsis**

10 (7). Scutellum about 1/2 as deep as long in profile, sharply divided by 2 high carinae into dorsal and lateral surfaces, the former exceedingly deeply excavated longitudinally, the latter posteriorly vertical ..... **Enderleinia**

Scutellum never so deep in profile, its lateral surface linear, never sharply separated from dorsal surface 11

11 (10). [Longitudinal vein 1 of wing branched near middle and then reunited near apex, forming a narrow elongate supernumerary cell; hind tibia with only 1 lateral spine; head much narrower than pronotum; anterolateral pronotal margin never shorter than breadth of eye (not Machaerotidae; here included for reference) ..... **Pseudomachaerota**]

Longitudinal vein 1 of wing simple, no supernumerary cell near wing apex; hind tibia almost always with 2 lateral spines, but when seldom with basal one absent or poorly definable, then head hardly narrower than pronotum,

and anterolateral pronotal margin much shorter than breadth of eye..... 12

12 (11). Pronotum distinctly broader than head, its anterolateral margin 1.5× or more as long as breadth of tylus; body robust, strongly humpbacked, planes of anterior pronotal portion and upper postclypeal portion forming a right or obtuse angle 13

Pronotum hardly broader than head, its anterolateral margin shorter than breadth of tylus; body rather slender, weakly humpbacked, planes of anterior pronotal portion and upper postclypeal portion forming a right or acute angle... 15

13 (12). Tegmen with prominent, deeply pigmented veins and smooth preapical and apical cells; pleurostome broader than lorum; eye distinctly broader than tylus.....**Polychaetophyes**

Tegmen with improminent, feebly pigmented veins and punctate preapical cells; pleurostome narrower than lorum; eye as broad as or narrower than tylus... 14

14 (13). Tylus as broad as eye; corial appendix reaching 2/3 of apical tegminal margin; ♂ postclypeus evenly convex; ♀ anal style 1/2 longer than broad at base; pronotum rugose-reticulate.....**Makiptyelus**

Tylus broader than eye; corial appendix not reaching 1/2 of apical tegminal margin; ♂ postclypeus tuberculate at center; ♀ anal style as long as broad at base; pronotum punctate..... **Taihorina**

15 (12). Head exceptionally short, median length of crown equal to side length, tylus practically entirely merged into postclypeus, supra-antennal area longly tetragonal; rostrum apically reaching hind coxae; legs exceptionally long, hind tibia longer than head and pronotum together; basal 1/2 of R of tegmen running very close to costal margin, hardly curved, and forming no basicostal triangle ..... **Labrosyne**

Head moderately long, median length of crown distinctly greater than side length, tylus large and well exposed, supra-antennal area broadly trigonal; rostrum apically only reaching mid coxae; legs short, hind tibia much shorter than pronotum alone; basal 1/2 of R of tegmen strongly curved and divergent from costal margin, hence forming a large basicostal triangle.....16

16 (15). Tegminal clavus clear transparent with prominent veins, 2 longitudinal veins and 2 or more crossveins in between; scutellum deeply, distinctly excavated at disc. Ethiopian forms..... **Neuromachaerota**

Tegminal clavus not as above, either clear transparent and with only 1 prominent, apically branched longitudinal vein, or not clear transparent and with indistinct veins; scutellum convex or flattened, at most very feebly depressed at disc. Mostly Oriental forms.....17

17 (16). Tegminal vein Rs and M suddenly strongly bent analwards from base of apical cells; hind tarsus with median length of segment 1 subequal to 2+3; lateral spine 1 (*i. e.*, the one near base) of hind tibia longer than (rarely only as long as) longest apical tibial spine; face including supra-antennal triangle almost entirely concealed (in vertical view of crown) and bordered by a complete arcuate carina between eyes; ♂ postclypeus with oblong crater-like tumescence near top..... **Hindola**

Tegminal veins Rs and M gently curved near apices; hind tarsus with median length of segments 1+2 usually subequal to 3; lateral spine 1 of hind

tibia shorter than longest apical tibial spine; face usually partly exposed in vertical view of crown and usually not separated from latter by a complete arcuate carina; ♂ postclypeus lacking such tumescence, at most with a short median carina 18

18 (17). Tegmen at least smooth at apical and preapical cells, its veins strongly prominent and deeply pigmented; R always forked beyond middle of tegmen; corial appendix usually much larger than claval appendix; sexual dimorphism often very strong, head of ♀ often much more produced forwards than in ♂ ..... **Chaetophyes**

Tegmen densely punctate throughout, its veins generally weak and pale, never strongly prominent or distinctly darker than ground color, R often forked before middle of tegmen; corial appendix almost always subequal in size to claval appendix; sexual dimorphism weak, head always similar in both sexes...19

19 (18). Breadth of pronotum subequal to length of head and pronotum together; corial appendix much larger than claval appendix; head and pronotum strongly produced forward with anterior pronotal margin reaching about level of anterior eye-margin when in vertical view of crown; R forked well beyond middle of tegmen ..... **Aecalus**

Breadth of pronotum distinctly greater than length of head and pronotum together; corial appendix nearly as large as or even much smaller than claval appendix; head and pronotum normal, anterior pronotal margin never reaching level of anterior eye-margin; R generally forked before middle of tegmen ..... **Pectinariophyes**

Tribe HINDOLOIDINI (Baker)

Hindoloidesini [sic] Bkr. 1927: 533; Hindoloidinae Maa 1947: 4 & 18; Hindoloidesina [sic] Lallemand 1951: 88.

Body small, short, compact, strongly humpbacked; rather strikingly Clastopterinae-like. Corial appendix of tegmen longitudinally wrinkled. Hind tibia always with 2 lateral spines. Abdomen quite short, hardly or not extending beyond level of scutellar apex. Nymphal tube spiral-like. Other characters as in the key.

RANGE: E. African, Indian, Indo-Chinese and Papuan subregions, partly spread to Manchurian (S. Japan) and Australian (Queensland) subregions; 4 genera and 8 species.

Genus **Aphrosiphon** China

Aphrosiphon China 1935: 82. Orthotype: *A. bauhiniae* China.

RANGE: E. African subregion, open forest; 1 species.

Aphrosiphon bauhiniae China

Aphrosiphon bauhiniae China 1935: 83, fig. 1, ♀♂.

MATERIAL EXAMINED: NYASALAND: Holotype ♀, allotype ♂, 2 nymphal tubes (BMNH): Fort Johnson; 2 ♀ paratypes, nymphal tubes and skins (OXF), same data.

HOST PLANT: *Bauhinia* sp. (Leguminosae).

Known only from the type series, 3 ♀♀ and 1 ♂. In company with China's description, G. D. Hale Carpenter published W. A. Lamborn's brief observations on the nymph.

Genus **Soamachaerota** Metcalf

Soa Jacobi 1928: 46 (preoccupied, not *Soa* Enderlein 1904 in Plecoptera). Orthotype: *Polychaetophyes appendiculata* Hacker.

Soamachaerota Metcalf 1952: 228 (n. name for *Soa* Jacobi not Enderlein). The genus was wrongly placed by this author (1960: 20) under Hindolini [Enderleiniini].

Crown rather short, when viewed vertically to its plane, median length about 1.5× side length. Postclypeus strongly convex, moderately protruding forward. Pleurostome slightly broader than lorum. Eye large, as broad as tylus, nearly as long as broad when viewed vertically to plane of crown. Tylus distinctly broader than its distance to eye. Interocellar distance 1/2 of ocello-ocular distance. Pronotum distinctly broader than head; median carina wanting; anterolateral margin almost entirely carinated, slightly shorter than breadth of eye, about 2/5 as long as posterolateral margin, anteriorly hardly reflexed; posterolateral margin slightly, and posterior margin deeply sinuate. Scutellum slightly broader than interocular distance. Tegmen transparent; veins fairly distinct, basally more or less weak; venation simple; R+M only 2/7 as long as corium; abscissae 1 of R and M short, subequal in length; R with 4–5 short crossveins near apex and extending to costal margin; R, M and Cu shortly bifurcate at apex, forming together 3 very short, depressed, apical cells (preapicals entirely merged into apicals); Cu joining M by a very short crossvein at point of basal 1/3, thence strongly converging to claval furrow at middle; clavus apically broadly rounded; 1A joining 2A by a crossvein near middle, forked at apex; corial appendix 1/3 as long as broad, slightly shortened at posterior portion; claval appendix isogonally subtriangular, acute at apex. Apical 1/3 of tegmina, when closed, folding beyond claval apex and overlapping each other to cover abdominal apex; in profile, this apical 1/3 about 60° to horizontal plane.

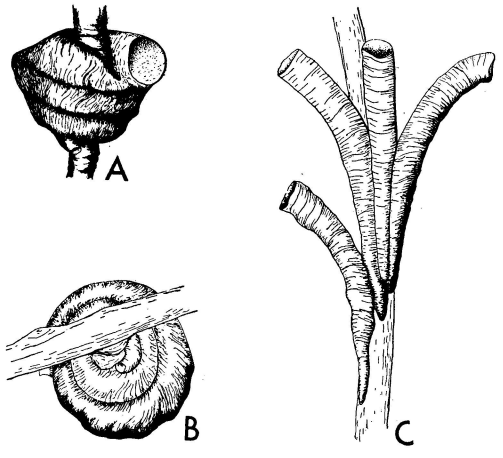

Fig. 2. Nymphal calcareous tubes of Machaerotidae. A, *Soamachaerota appendiculata* Hack., side view; B, same, bottom view; C, *Pectinariophyes stalii* Spgbg., side view.

RANGE: Australian subregion (Queensland), submontane; 1 species.

Soamachaerota appendiculata (Hacker) Figs. 2 A–B, 3A, 5 A–B, 7 B–F, 24A.

Polychaetophyes appendiculata Hack. 1926: 247, fig. 1, ♀.
Soa tmetoptera Jacobi 1928: 47, ♂♀. **New Synonymy.**
Soamachaerota appendiculata + *S. tmetoptera*, Metcalf 1960: 20, 21.

Male: Shining black; gena, lorum and tentorial pit brown. Tegmen variable in color, in paler specimens, nearly colorless with large, roundish, brownish black marking at disc and at claval apex, costal margin brownish black at extreme base and at middle 1/3, brown at basal 1/3 of clavus; in darker specimens, brown, paler at both ends of cell 1r, at apical 1/3 of 1m and at apical cells (apical cell 2 and antero-apical corner of clavus nearly colorless), brownish black along nearly full length of costal margin, and greyish yellow at corial appendix, forming an inconspicuous broad fascia crossing middle of corium. Tegminal veins brown or brownish black, more or less paler basally. Knees, tibiae (both ends) and tarsi of fore and mid legs brown, hind tibia also brown.

Postclypeus evenly convex, minutely punctate. Tylus smooth, distinctly concave, with a median furrow; side piece of vertex shallowly depressed, obliquely wrinkled; tentorial

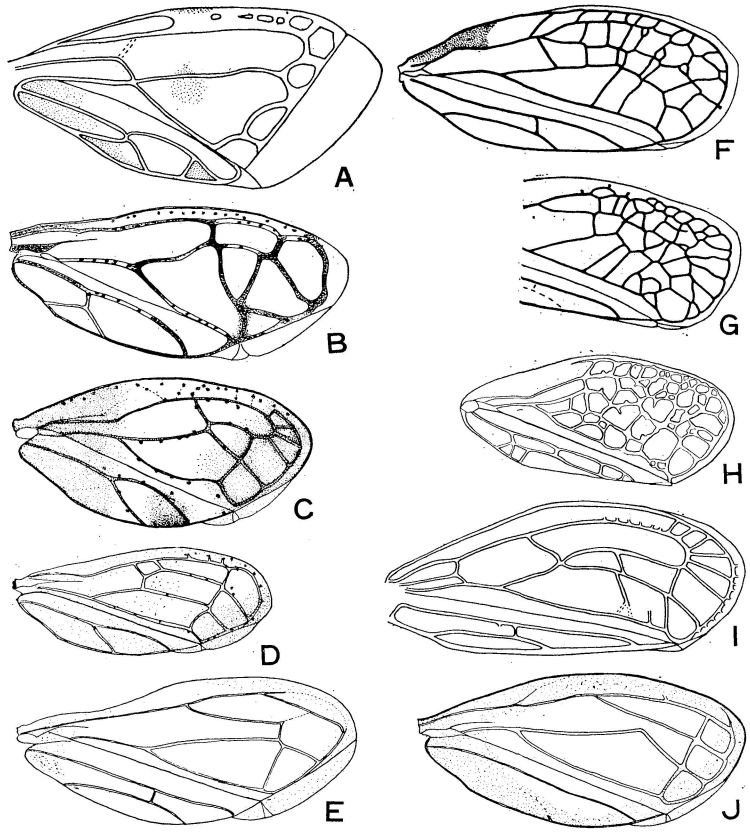

Fig. 3. Enderleiniinae, tegmina (all except A, G–I drawn at same magnification). A, *Soamachaerota appendiculata* Hack. (drawn from holotype ♀ of *tmetoptera* Jac.); B, *Machaeropsis rubrilineata* Maa, holotype ♀; C, *Polychaetophyes serpulidia* Kirk., holotype ♀; D, *Makiptyelus dimorphus* Maki, ♀; E, *Labrosyne longipes* Maa, holotype ♀; F, *Pectinariophyes reticulata* Spgbg., ♀ paratype; G, same, holotype ♀; H, *P. stalii* Spgbg., transitory intersex; I, *P. hyalinipennis* Stål, holotype ♀; J, *Aecalus pembertoni* Maa, paratype ♀.

pit roundish, very shallow; occipital margin slightly reflexed; ocellar area discally slightly depressed; supra-antennal triangle usually ill-defined, finely wrinkled. Pronotum coarsely wrinkled; calli rather shallow, transverse; lateral corner obliquely wrinkled. Scutellum coarsely punctate-rugose, sometimes with a weak short carina at middle 1/3; median area near base more or less depressed; extreme apex depressed, nearly smooth. Tegmen coarsely punctate at basal 1/2 of clavus, elsewhere smooth; cells at apical 1/4 of corium distinctly concave; ambient vein much weaker than neighboring ones; corial appendix with undulate longitudinal wrinkles; basicostal area deeply depressed; veins (except R+M and abscissae 1 of R and M), with small, scattered, setigerous punctures; cells 1r and 1m also with few such punctures. Lateral tubercle of metathorax weakly developed. Relative lengths of pronotum and scutellum 25 : 26; relative breadths of head, pronotum and scutellum 31 : 37 : 16. Tegmen 3.7–4.0 mm long.

Female: Similar. Reddish brown; postclypeus medially black, laterally with about 6 testaceous, hairy transverse lines. Tegmen yellowish hyaline, with a rather broad and conspicuous brown fascia across middle of corium; clavus largely brown, paler at anterobasal area; veins brown, also paler near base. Tibiae largely brown. Venter of thorax testaceous, abdomen brown to black. Side piece of vertex hardly concave; pronotal wrinkles weaker. Tegmen 5 mm long.

MATERIAL EXAMINED: QUEENSLAND: 1♂ (STK, holotype of *tmetoptera*), Mt. Tambourine; 1♂ (CJD), Gold Creek, 29. IX. 1929, H. Hacker; 1♀ (QM, holotype of *appendiculata*), Bunya Mts., 950 m; 1♀ (CJD), Woogaroo, 1. III. 1927, Hacker; 1♀ (AM), Tambourine, Illidge.

HOST PLANT: *Eucalyptus* sp. (Myrtaceae).

A direct comparison of the types of *appendiculata* and *tmetoptera* failed to reveal any important structural differences and I do not hesitate in synonymizing the two.

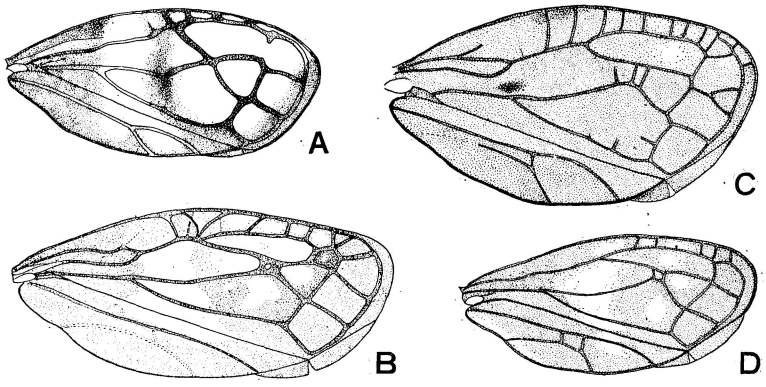

Fig. 4. *Chaetophyes* spp., tegmina drawn at same magnification. A, *kukukukui* Maa, holotype ♂; B, *admittens* Wk., ♀; C, *compacta* Wk., ♀; D, *vicina* Lall., ♀.

Genus **Hindoloides** Distant

Hindoloides Dist. 1915: 506. Orthotype: *H. indicans* Dist.
Weigoldella Haupt 1923: 299. Orthotype: *W. bipunctata* Hpt.

Crown long, when viewed vertically to its plane, median length 1.5–2.5× side length. Pleurostome 1.5× as broad as lorum. Eye rather small, slightly narrower than tylus, nearly as long as broad when viewed vertically to plane of crown. Tylus distinctly broader than its distance to eye. Interocellar distance 2/3 of ocello-ocular distance. Pronotum much broader than head; median carina usually wanting; anterolateral margin about 2.5–3.0× as long as interocellar distance, about 2/5–1/2 as long as posterolateral margin, hardly reflexed; posterolateral margin less deeply sinuate than posterior margin. Scutellum slightly broader than interocular distance. Tegmen nearly hyaline or not transparent; veins very indistinct and rather intraspecifically variable; R often forked near apex; rm usually present; M_{1+2} and M_{3+4} usually long, M_{1+2} sometimes branched at apex, Cu_1 rather strong, apart from claval furrow; almost always 3 apical cells; preapical cell 3, when present, triangular, large, enclosed by M-stem, M_{3+4} and Cu_1; clavus apically very broadly rounded, 1A and 2A adnate at base; corial appendix subrectangular, 2/5–1/2 as long as broad; claval appendix trapezoid. Apical 1/2 or 1/3 of tegmina evenly convex or rather abruptly bent mesad, when closed, corial appendices, and sometimes also apices of coria proper, overlapping one another and about 45°–60° to horizontal plane.

RANGE: Indian (Bengal) and Indo-Chinese subregions, spread to Manchurian subregion; lowland and submontane; 4 species.

The members of this genus may be assigned to 2 species-groups, represented by *indicans* and *bipunctata* respectively. They differ in the shape of head, transparency of tegmen, relative length of anterolateral pronotal margin and sculpture on pronotum and tegmen.

KEY TO SPECIES OF HINDOLOIDES

1. Dorsum olive green, with indistinct brown markings; scutellar apex reddish brown; face, breast, abdomen and legs ochraceous, with a large black spot on mid coxa [? venter of mesothorax]; hind femur nearly black; tegmen nearly hyaline, irregularly covered with small blackish brown punctures. Body length ♀ 5.5 mm... ..... ***sparsuta**

   Color pattern not as above, either much darker and tegmen not transparent, or when body pale and tegmen nearly transparent, then side of postclypeus and venter of mesothorax with a large black spot at each side, scutellar apex and hind femur of general color and tegmen lacking blackish punctures..... 2

2. Head not snout-like; median length of crown (viewed vertically to its plane) only about 1.5× side length; pronotum with distinct sparse punctures and fine indistinct rugae; tegmen nearly hyaline, rather finely, sparsely punctate..... **indicans**

   Head very distinctly snout-like; median length of crown more than 2× side length; pronotum coarsely, deeply rugose, with no distinct punctures except at lateral angle and ante-callus area; tegmen not transparent, coarsely reticulate-punctate..... 3

3. Dorsum of body with 3 shining black and 2 bright yellow longitudinal stripes, in strong contrast; pronotum with feeble median carina; ♂ 4 mm long, ♀ 4.5 mm ..... **trilineata**

   Body color variable, from brown to red and black, never with strongly contrasting black and yellow stripes; pronotum lacking any trace of median carina..... ..... **bipunctata**

Hindoloides indicans Distant Figs. 5 C–D, 7 G–J, 24B.

Hindoloides indicans Dist. 1915: 507; 1916: 197, fig. 150 (brief redescr.)—Baker 1927: 544, pl. 3 (36–39) (structure).

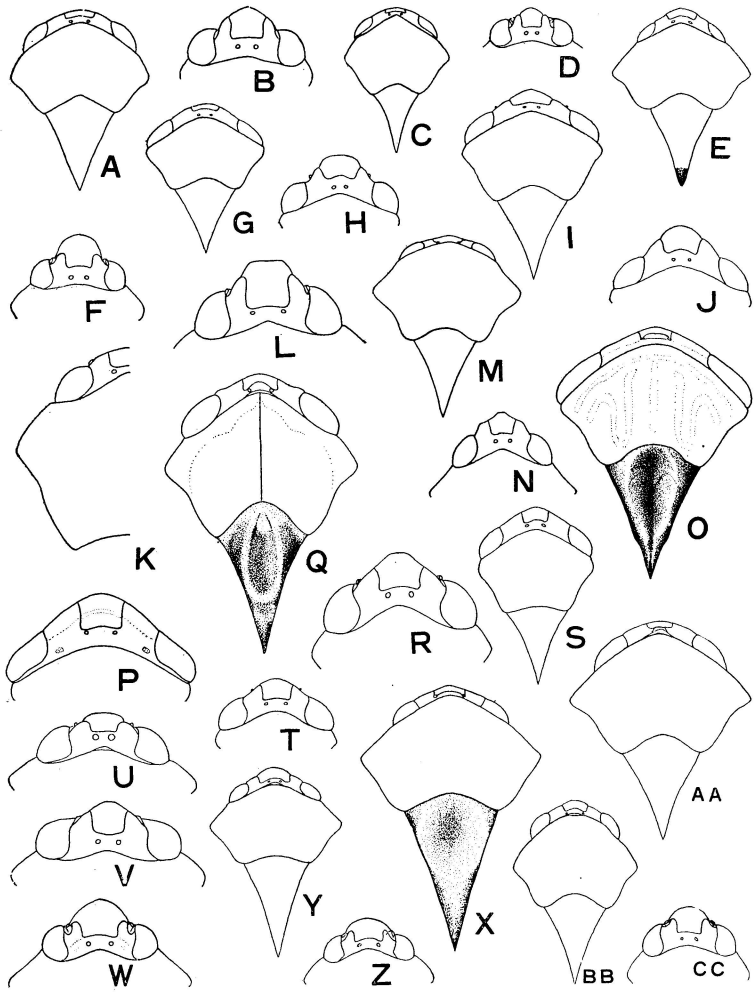

Fig. 5. Enderleiniinae, head, pronotum, nad scutellum, dorsal view, all drawn at same magnifiation (figures showing only head and part of pronotum drawn to a plane vertical to crown). A-B, *Soamachaerota appendiculata* Hack.; C-D, *Hindoloides indicans* Dist.; E-F, *H. bipunctata* Hpt.; G-H, *Trigonurella simonthomasi* Maa; I-J, *T. szentivanyi* Maa; K-L, *Apomachaerota reticulata* E. Schmt.; M-N, *Serreia notabilis* Bkr.; O-P, *Machaeropsis rubrilineata* Maa; Q-R, *Enderleinia bispina* E. Schmt.; S-T, *Neuromachaerota discigutta* Maa; U-V, *Polychaetophyes serpulidia* Kirk. (U drawn to a plane vertical to pronotum, see also AA); W-X, *Taihorina geisha* Schum.; Y-Z, *T. simplex* Maa; AA, *Polychaetophyes serpulidia* Kirk. (see also U-V); BB-CC, *Makiptyelus dimorphus* Maki.

Female: Ochraceous (green in life ?). Face and tegmen yellow. Postclypeus moderately convex, minutely, scatteredly punctate, with a large brownish black spot at each side at level of antennal sockets, 4 broad, inconspicuous, ochraceous transverse lines below. Pleurostome densely punctate. Lorum convex. Crown shining, with a few indistinct minute punctures; median length 1.5× side length when viewed vertically to its plane. Tylus weakly convex, with a small oval discal pit; side piece of vertex discally depressed, weakly obliquely rugose, anteriorly convex, smooth, rounded off to antennal ledge; ocellar area medially elevated; ocelli a little closer to tylus than to occipital margin; tentorial pit roundish, shallow; occipital margin slightly reflexed near middle. Pronotum strongly convex, with distinct, rather sparse, medium-sized punctures (finer near median line) and fine, indistinct rugae; calli shallow; anterolateral margin practically straight, 1/2 as long as interocular distance. Scutellum feebly rugose and convex, extreme apex slightly flattened. Relative lengths and breadths of head, pronotum and scutellum 10 : 22 : 23 and 25 : 33 : 14 respectively. Tegmina nearly transparent, yellow, with rather sparse, medium-sized punctures all-over; when closed, apical 1/3 rather abruptly bent mesad, apices of coria nearly meeting each other and corial appendices in profile about 60° to horizontal plane; costal and apical margins slightly darker; venation somewhat different from that illustrated by Baker (*l. c.*), apical cell 1 often subdivided into 2 cellules, apical cell 3 and preapical cell 3 separated by an oblique vein, along which the tegmen is bent inwards; clavus brown, broadly whitish along basal 1/2 of claval furrow; claval vein Y-shaped; corial appendix longest near tegminal apex, not shaped as in Baker's figure, length to breadth 12 : 28. Venter of body slightly paler; venter of mesothorax with a large discal black spot; hind tibial spines apically black. Body length 4 mm.

Male: Similar, not distinctly darker than ♀. Costal margin with 4–6 brown spots near middle. Body length 3.3 mm.

MATERIAL EXAMINED: BENGAL: 2 ♀♀ (USNM, ex C. F. Baker coll.), Calcutta (Maidan), 27. IX. 1915, on *Zizyphus jujuba*, F. H. Graveley; 2♂♂, 2♀♀ & nymphal tubes (BMNH, holotype ♀, & paratypes), same data but 26. VII. 1911 and 30. V. 1912 respectively.

HOST PLANT: *Zizyphus jujuba* Lam. (Rhamnaceae).

***Hindoloides sparsuta** Jacobi

Hindoloides sparsuta Jac., 1944: 24, ♀.

From the very short original description, which is completely translated in the above key, this species seems closely allied to *indicans*, but the body size is larger and the color pattern slightly different. The type ♀ from Fukien: Shaowu at Dresden Mus. was destroyed during the war.

Hindoloides bipunctata (Haupt) Figs. 5 E–F, 7 K–M, 24C.

Weigoldella bipunctata Hpt. 1923: 300, fig. 3, ♀. Type, Szechwan: Kwanhsien (DDN).

Hindoloides formosana Kato 1929: 543, fig. 1, ♀. Type, Taiwan: Koshun (=Hungchuen) (TCM). **New Synonymy.**

Hindoloides rubrodorsum Esaki 1931: 266. Type, Honshu (Yamato: Yoshino; Kyoto) (KU). **New Synonymy.** Wrongly spelled *rubridorsum* and *ubrodorsum* by Matsumura (1940: 82) and Esaki (1932: 1718) respectively.

H. rubrodorsum var. *albifascia* Kato 1933: 32. Type, Honshu: Kyoto (MKT). **New Synonymy.**

H. rubrodorsum var. *marginale* [sic] Kato 1933a: pl. 46(8). Type, Honshu: Kyoto (MKT). **New Synonymy.**

H. bipunctata var. *diluta* Maa 1947: 5 & 19, ♀. Type, Fukien (Shaowu: Tachulan, 1500 m) (TCM). **New Synonymy.**

H. bipunctata var. *scutellata* Maa, *l. c.*, ♂. Type, Fukien (Shaowu: Tachulan) (TCM). **New Synonymy.**

H. formosana (p. 22)+*H. rubrodorsum*+*H. rubrodorsum* var. *albifascia* (p. 23)+*Weigoldella bipunctata* (p. 25)+*W. bipunctata* var. *diluta*+*W. bipunctata* var. *scutellata*, Metcalf 1960: 22–31, 25–26.

Head very distinctly snout-like. Pleurostome obliquely punctate-rugose. Lorum depressed. Crown with some distinct medium-sized punctures on side piece of vertex (anterior portion) and ocellar area; median length more than 2× side length when viewed vertically to its plane. Tylus transversely depressed, with some fine obscure longitudinal striae; side piece of vertex discally depressed, obliquely rugose; supra-antennal triangle well defined, depressed, densely punctate; ocellar area medially elevated (more strongly so in ♂); ocelli equidistant to tylus and occiput; tentorial pit roundish, shallow; occipital margin weakly reflexed near middle. Pronotum not so strongly convex as in *indicans*, coarsely, deeply reticulate-rugose, with no distinct punctures except near lateral angle and at antecallus area; calli shallow; anterolateral margin distinctly convexly curved, about 1/2 as long as interocular distance. Scutellum nearly flattened, more finely and shallowly rugose than pronotum. Relative lengths of head, pronotum and scutellum 10.5 : 20 : 20 in ♂ and 12.5 : 22.25 : 25.25 in ♀; relative breadths of the same 22 : 31 : 13 in ♂ and 24 : 36.5 : 16 in ♀. Tegmina not transparent, coarsely reticulate-punctate; when closed, apical 1/2 evenly curved mesad, apices of coria far from each other, corial appendices overlapping one another and about 45° to horizontal plane. Body length ♂ 3.8–4.0 mm, ♀ 5.

HOST PLANT: *Prunus donarium* Sieb. (Rosaceae).

MATERIAL EXAMINED: SHIKOKU: 1 ♂, 1 ♀ (TCM), Tokushima, 1. V. 1955, T. Kobayashi. HONSHU: 1 ♀ (CAS), Ohara, Kyoto, 30. IV. 1935, P. H. Arnaud; 1 ♀ (TCM), Kibune, Kyoto, 27. VI. 1929, M. Kato. TAIWAN: 1 ♀ (TCM), holotype of *H. formosana* Kato.

Also recorded from Mainland China (Szechwan, Fukien) and Japan (Kyushu).

An examination of the material from Japan and of the holotype of *H. formosana* Kato, very generously donated to me by Dr. M. Kato confirms my earlier suggestion (*l. c.*) that both *formosana* and *rubrodorsum* are synonyms of *bipunctata*. Although this species spreads widely along the southern border of the Manchurian subregion and shows much color variation, the material at hand does not permit division into subspecies.

Hindoloides trilineata Maa

Hindoloides trilineata Maa 1947: 6 & 19, ♂♀. Type, Fukien (Shaowu: Tachulan, 1500 m) (TCM).

The ♂ holotype was lost in the last World War, but the ♀ allotype and ♀ paratype survived.

Genus **Trigonurella** Maa, n. gen.

Orthotype: *Trigonurella simonthomasi* Maa, n. sp.

Body shining. Crown short. Postclypeus strongly convex, protruding forward, broadly longitudinally depressed near center. Pleurostome about 2× as broad as lorum; gena proper long. Eye large, broader than tylus, distinctly transverse in vertical view of crown. Tylus as broad as its distance to eye. Interocellar distance 2/5 of ocello-ocular distance.

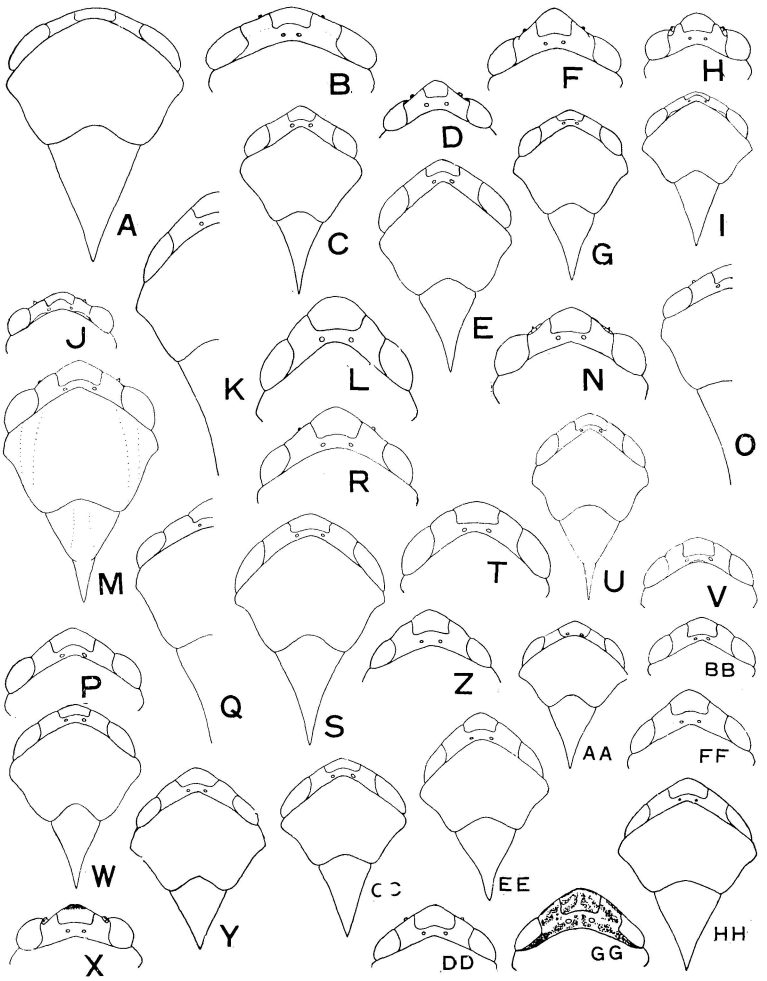

Fig. 6. Enderleiniini, head, pronotum and scutellum, dorsal view, all drawn at same magnification (figures showing only head and part of pronotum drawn to a plane vertical to crown). A-B, *Labrosyne longipes* Maa; C-D, *Pectinariophyes notanda* Dist.; E-F, *P. luzonensis* Bkr.; G-H, *P. basicostalis* Maa; I-J, *P. rudinotum* Maa; K-L, *Aecalus pembertoni* Maa; M-N, *Chaetophyes lubricans* Maa; O-P, *Ch. kukukukui* Maa; Q-R, *Ch. bloetei* Maa; S-T, *Hindola* (*Hindola*) *apicalis* Maa; U-V, *H.* (*H.*) *pahangana* Lall.; W-X, *H.* (*H.*) *tumidula* Maa; Y-Z, *H.* (*H*). *taiwana* Kato; AA-BB, *H.* (*H.*) *nitida* Bkr.; CC-DD, *H.* (*H.*) *striata* Maa; EE-FF, *H.* (*H.*) *fulva* Bkr.; GG-HH, *H.* (*Platycotta*) *prostrata* Maa.

Pronotum hardly broader than head; median carina wanting; anterolateral margin carinated, only about as long as interocellar distance; posterolateral margin nearly straight; posterior margin deeply sinuate. Scutellum narrower than interocular distance, evenly, weakly convex. Tegmen not transparent; veins indistinct, R branched at apical 1/3, with a long crossvein in between; Cu rather apart from claval furrow; rm and mcu both present; preapical cell 1 and all apical cells convex and reticulate; clavus apically broadly truncate; 1A simple, weakly developed at base, joining 2A at middle by a crossvein; corial appendix subtriangular, 1/2 as long as broad, strongly wrinkled throughout, anteriorly acute, far from reaching tegminal apex; claval appendix very short, triangular. Apical 1/2 of tegmina evenly convex; when closed, only corial appendices overlapping each other and forming an oblique obtriangular areole about 30° to horizontal plane. Wing venation normal. Segment 1 of hind tarsus subequal in length to 2+3.

RANGE: Papuan subregion, sea level to 2000 m, rain forest; 2 species.

The name of this genus is derived from the Greek, *trigonia*, a triangle and *ourella*, a small tail, and refers to the characteristic corial appendices. The shape of these appendices and the very short anterolateral pronotal margin immediately separate this genus from other members of the tribe.

KEY TO SPECIES OF TRIGONURELLA

Anterior margin of crown broadly, distinctly raised; tylus in profile distinctly higher than general plane of ocellar area and anterior portion of pronotum; vertex strongly depressed discally; pronotum in ♀ with some distinct punctures amongst rugae; ocellar area whitish, in strong contrast with its surroundings. Female 4.5 mm long. Montane species ..... **szentivanyi**

Anterior margin of crown very weakly raised; tylus in profile in line with general plane of ocellar area and anterior portion of pronotum; vertex very weakly depressed; pronotum in ♀ with no distinct punctures amongst rugae; ocellar area scarcely paler than its surroundings. Female 4.0 mm long. Lowland species ..... **simonthomasi**

Trigonurella simonthomasi Maa, n. sp. Figs. 5 G–H, 7 N–Q, 24D.

Male: Shining black. Ocellar area blackish brown to black. Basal 2/3 of rostrum brown. Venter of thorax and abdomen dark brown; anterolateral 1/3 of venter of mesothorax greenish white. Hind leg brown, tarsomere 1 and venter of tibia yellowish. Tegmen brownish black, darkest at clavus; extreme apical margin narrowly transparent; corial appendix slightly paler than corium proper.

Postclypeus broadly flattened, sometimes slightly longitudinally depressed at upper 3/5; lateral rugae practically unrecognizable; punctures very minute and fairly scattered. Pleurostome with slightly denser punctation than on postclypeus. Crown smooth, hardly concave; occipital margin strongly reflexed; tylus and ocellar area nearly plane; side piece of vertex anteriorly with 3 or 4 coarse, oblique rugae; tentorial pit oval, transverse, very shallow. Tylus in profile in line with general plane of ocellar area and anterior portion of pronotum, upper portion of postclypeus in profile subangulate to crown and to anteclypeus. Pronotum wrinkled, with no distinct punctures except at lateral corners; ante-

callus area not well defined; calli transverse, indistinct; anterior margin weakly reflexed. Scutellum less strongly wrinkled than pronotum; apex depressed or flattened. Tegmen with deep subcostal depression; punctures coarse, finer and sparser at disc, and reticulate at apex; corial appendix coarsely, irregularly wrinkled; clavus depressed preapically. Relative lengths of pronotum and scutellum 17.5 : 18; relative breadths of head, pronotum and scutellum 26.5 : 28 : 12. Body length 3.5 mm.

Female: Similar to ♂, slightly paler. Body length 4 mm.

NW NEW GUINEA: Holotype, ♂ (BISHOP 3208), Bodem, 100 m, 11 km SE of Oeberfaren, Sarmi Distr., 7–17. VII. 1959, T. C. Maa. Allotype, ♀, Waris, 450–500 m, 100 km S. of Hollandia, 1–17. VIII. 1959, Maa. Paratypes, 1 ♂, 1 ♀, same data as holo- and allotypes respectively.

Trigonurella szentivanyi Maa, n. sp. Figs. 5 I–J, 7 A, R–U, 24E.

Male: Brownish black. Head and scutellar apex shining black, ocellar area whitish,

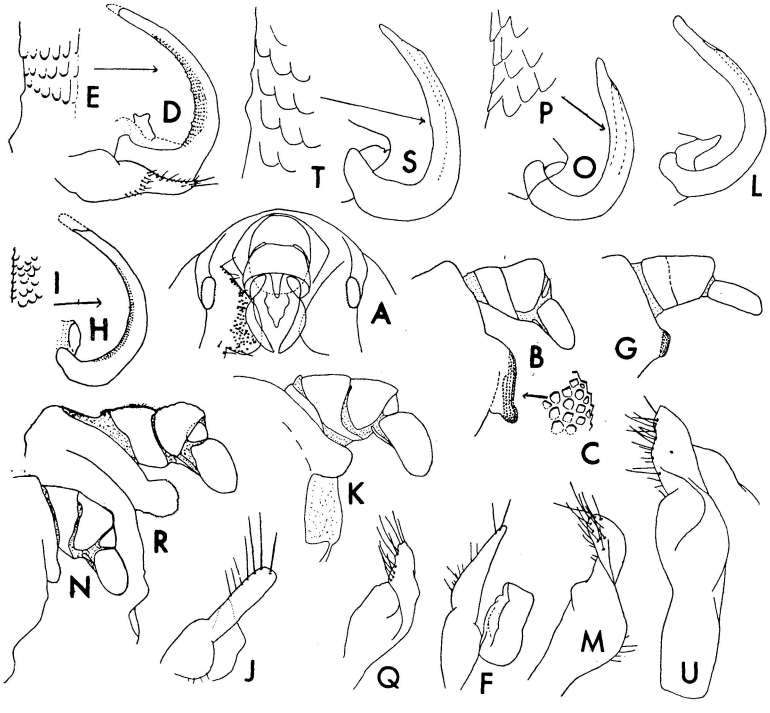

Fig. 7. Hindoloidini, ♂ genitalia, upper part, hind view (A); same, side view (B, G, K, N, R); scabrous area of pygofer, sculpture (C); aedeagus and periandrium (D, H, L, O, S); aedeagal scales (E, I, L, P, T); paramere, side view (M, Q); paramere and part of basal plate, side view (F, J, U). A, *Trigonurella szentivanyi* Maa; B-F, *Soamachaerota appendiculata* Hack.; G-J, *Hindoloides indicans* Dist., paratype; K-M, *H. bipunctata* Hpt. from Honshu; N-Q, *Trigonurella simonthomasi* Maa, holotype; R-U, *T. szentivanyi* Maa, holotype. Figures drawn at different magnifications.

in strong contrast to surroundings; anteclypeus and lower 1/2 of postclypeus reddish brown. Fore coxa, anterolateral 1/3 of venter of mesothorax and basal 1/2 of rostrum whitish. Hind leg brown, paler on coxa, tibia and tarsomere 1. Tegmen similarly colored as in the preceding species.

Upper 1/2 of postclypeus evenly convex; lower 1/2 broadly, shallowly foveate. Crown deeply, transversely depressed between eye and ocellar area, distinctly broadly raised along anterior margin. Ocellar area longitudinally raised; vertex anteriorly with 2–3 very fine arcuate rugae. Tylus in profile distinctly higher than general plane of ocellar area and anterior portion of pronotum; postclypeus in profile rounded-off to crown and anteclypeus. Scutellum as strongly wrinkled as pronotum. Relative lengths of pronotum and scutellum 19.5 : 23.5; relative breadths of head, pronotum and scutellum 32.5 : 34.5 : 15. Other structural characters similar to the preceding species. Body length 3.75 mm.

Female: Similar to ♂, distinctly paler and tinted with red. Pronotum with some distinct punctures amongst rugae. Body length 4.5 mm.

NW NEW GUINEA: Holotype, ♂ (BISHOP 3209), Karubaka, 1400 m, Swart Valley, 6. XI. 1958, J. L. Gressitt. Allotype, ♀, W. Ridge, 1800–2000 m, Swart Valley, 19. XI. 1958, Gressitt.

This and the preceding species are named after Dr. J. J. H. Szent-Ivany of Port Moresby, Papua and Mr. R. T. Simon Thomas, formerly of Hollandia, W. New Guinea, respectively, as a humble token of gratitude for their help and cooperation during my field work in New Guinea.

Tribe ENDERLEINIINI E. Schmidt 1907: 167

Hindolini Baker 1927: 531; Hindolinae Maa 1947: 6 & 20.

Body usually more elongate than in Hindoloidini, medium to large size, strongly to weakly humpbacked, and often Aphrophorinae-like. Corial appendix of tegmen usually smooth. Hind tibia with 2, seldom 1 lateral spine. Abdomen moderately short, its apex often extending beyond level of scutellar apex. Nymphal tube usually subconic. Other characters as in key.

RANGE: Same as family; 14 genera, 45 species.

As shown in figs. 25, 26, 34, the genera of this tribe can be divided into 2 major groups. The first group is restricted to the Orient and is composed of *Apomachaerota*, *Serreia*, *Machaeropsis* and *Neuroleinia*. The first 2 genera exhibit little sexual dimorphism except body size and color pattern. Their tegmina are all transparent and have prominent and deeply pigmented veins. The venational scheme represents the 2 extremes of the family, strongly reticulate in *Apomachaerota* and exceedingly simplified in *Neuroleinia*. The most important feature common to these 4 genera is the noticeably curved cubitus (of tegmen) which meets the claval furrow for some distance. Similar conditions are also found in most Hindoloidini but not in any Machaerotinae.

The second major group is more widely distributed and embodies the remaining 10 genera. The cubitus is always subparallel to the claval furrow and never meets the latter. They can be divided into 3 subgroups, represented by *Polychaetophyes*, *Hindola* and *Labrosyne* respectively. *Labrosyne* is rather isolated, still retains some archaic characters and is probably a side-branch of the main evolutional route of the family. The *Polychaetophyes*-

subgroup is characterized by the strongly humpbacked body and consists of *Enderleinia*, *Neuromachaerota*, *Polychaetophyes*, *Taihorina* and *Makiptyelus*. The first 2 genera are Ethiopian and both have distinctly excavated scutelli, whereas the next 3 are Oriental and all have narrow heads. The *Hindola*-subgroup consists of *Pectinariophyes*, *Chaetophyes*, *Aecalus* and *Hindola* and is characterized by the broad head and rather simple scutellum. The first genus, *Pectinariophyes*, has a discontinuous distribution from S. Africa to SE Australia and perhaps a further division is necessary. The remaining 3 genera are restricted to the Orient and (probably including *Aecalus*, the ♂ of which is unknown) show conspicuous sexual dimorphism in structure which is not found in most other genera of the family.

It may also be mentioned that although the names *Polytrichophyes*, *Chaetophyes* and *Trichophyes* are clearly derived from *Polychaetophyes* (which itself is derived from the Order Polychaeta of Annelida and refers to the appearance of the nymphal tube), actually they have no close affinities to the last named genus.

Genus **Apomachaerota** E. Schmidt

Apomachaerota E. Schmt. 1907 : 172. Orthotype : *A. reticulata* E. Schmt.

Body large, robust, strongly humpbacked, as broad as deep in profile. Head much narrower than pronotum. Anteclypeus strongly carinate ; postclypeus flattened. Pleurostome narrower than lorum, with long, stout, erect hairs, its lower end separated from lorum by a very short, faint, transverse suture ; maximum length of gena proper nearly 2× minimum breadth of pleurostome ; maxillary plate broadly exposed. Eye distinctly longer than wide, its inner margin straight and distinctly angulate at lower end ; outer margin weakly sinuate, not touching hind margin of head. Tylus distinctly broader than eye, about 2× as broad as side piece of vertex. Supra-antennal triangle entirely undefinable. Ocelli slightly or distinctly further from each other than from eyes. Pronotum minutely, scatteredly punctate ; anterolateral margin sharply carinate. Scutellum proper about 1/2 as deep in profile as long ; median line broadly, roundly, strongly raised ; lateral area rather abruptly descending ; scutellar apex flattened or recurved, in contact with closed tegmina, separated from scutellum proper by a strong constriction Tegmen short, broad, hyaline ; basicostal triangle finely punctate, elsewhere smooth ; veins very strong ; venation abnormal ; discoidal cell large, somewhat trifoliate-like, bordered by M, Cu and transverse vein parallel to apical ambient vein of tegmen ; M and Cu each strongly angulate with a free stub within the cell ; M strongly bullate near apex of this cell ; area beyond the above mentioned transverse vein with about 14 concave cells roughly arranged in 2 transverse series ; area between R and M and basad to transverse vein with about 5 concave cells ; costal margin with 10–13 small, irregular cells anterior to R ; apical 1/3 of Cu largely touching claval furrow ; clavus apically subtruncate, apical (" ambient ") vein curved in S-shape ; claval vein 1 adnate with 2 for some distance at middle and bullate near apex ; corial appendix nearly reaching tegminal apex. Hind tibia with only 1 lateral spine which is as long as breadth of tibial apex ; outer apical lobe of hind tarsomere 1 shorter than inner apical lobe. Female anal segment partly concealed ; anal style about 2× as long as profile depth at base ; ovipositor-sheath vertical.

RANGE : Malaysian subregion, submontane ; 1 species.

This is the giant of the subfamily. Its keeled anteclypeus, well exposed maxillary plate,

long interocellar distance, medially strongly raised and preapically constricted scutellum, reticulate tegminal venation, subtruncate claval apex and asymmetric hind tarsomere 1, are all unique for the tribe. The genus was unknown to Baker (1927: 531) who inadequately separated it from *Enderleinia* and other related genera by characters taken from E. Schmidt's crude drawings.

Apomachaerota reticulata E. Schmidt Figs. 5 K–L, 24F.

Apomachaerota reticulata E. Schmt. 1907: 174, fig. 3, ♂ (as *reticula* on p. 200).

Female (undescribed): Head and ante-callus area stramineous; pronotum proper yellowish green; scutellum proper vividly green; scutellar apex brown. Tegmen brown, broadly colorless at middle; veins all brown, with numerous setigerous punctures underneath; cells at basal 1/2 of tegmen with a few short fine setae underneath; wing colorless, also with short fine setae, but on upper surface. Legs stramineous near bases, brown near apices; tibial and tarsal spines of hind leg apically black. Abdomen brownish black.

Head moderately long. Lower 1/2 of postclypeus medially foveate. Crown weakly convex; side piece of vertex feebly wrinkled, with a distinct fovea near and parallel to lateral frontal suture; the latter curved and produced caudad via outer side of ocellus, then weakened; transverse frontal suture ill-defined, subparallel to occipital margin; tylus shallowly foveate; tentorial pit large, roundish, shallow; ocellar area with indistinct irregular rugae; ocelli further from each other than from eyes (8 : 6). Pronotum with very fine sparse punctures, their interspaces much wider than diameter of ocellus; ante-callus area weakly rugose at middle; calli shallow; median area with about 10 fine transverse striae behind calli. Scutellum similarly punctate as pronotum; its apex flattened, with roundish depression at extreme apex. Discoidal bulla of corium formed by M and adjacent veins large, subquadrate. Hind tibia about 8× as long as broad at middle; its lateral spine situated before middle. Relative lengths and breadths of head, pronotum and scutellum 20 : 54 : 54 and 47 : 75 : 35 respectively. Body proper 6.6 mm long (to apices of closed tegmina 11 mm), 4.8 high or broad; tegmen 9.4 mm long, 4.2 broad.

Male: Similar to ♀. Head shorter. Lower 1/2 of postclypeus broadly depressed at center. Side piece of vertex not foveate near lateral frontal suture. Ocelli nearly equidistant from each other and from eyes. Pronotum more shining than in ♀, lacking short rugae behind ante-callus area. Scutellar apex distinctly recurved. Relative lengths and breadths of head, pronotum and scutellum 15 : 45 : 45 and 41 : 62 : 30 respectively. Body proper 5.5 mm long (to apices of closed tegmina 8.8 mm), 3.6 high, 3.9 broad; tegmen 7.4 mm long, 3.6 broad.

MATERIAL EXAMINED: SUMATRA: 2♂♂ (BMNH ex V. Lallemand coll.), Soekaranda (the type ♂, not seen by me, is also from Soekaranda, and is in Warsaw Mus.). BORNEO: Neallotype ♀ (LDN), Mahakkam, 1894, Dr. Nieuwenhuis; 1 ♂ (BMNH ex Lallemand coll.), Long Petak, 450 m, IX–X. 1925, H. C. Siebers.

Genus **Serreia** Baker

Serreia Bkr. 1927: 535. Haplotype: *S. notabilis* Bkr.

This genus is allied to *Apomachaerota* and they have several characters in common, *viz.*, humpbacked body, narrow head, strongly upturned abdominal apex, smooth and transparent tegmen, "tailed" scutellum, quite prominent tegminal veins, bullate M and 2A, strongly curved cubitus and large corial appendix. The last 5 characters are unique for the tribe and are not shared by other related genera. Its differences from *Apomachaerota* are: Body much smaller, more flattened, distinctly wider than deep in profile; head in profile snout-like; anteclypeus less strongly carinate; postclypeus convex, no median furrow, ♂ with a weak, oval, median prominence near top; pleurostome broader than lorum, with long, fine decumbent hairs, its lower end plane, separated from lorum by a long deep suture; maximum length of gena proper and minimum breadth of pleurostome subequal; maxillary plate hardly exposed, its outer margin less strongly reflexed; eye about as long as wide, outer margin entire and in contact with hind margin of head; tylus distinctly narrower than eye (as broad as eye in Baker's figure), about 1/2 broader than side piece of vertex; ocelli much closer to each other than to eyes; pronotum coarsely, densely rugose-punctate; scutellum proper low, normal, slightly depressed medially; scutellar apex foveate, lacking basal constriction; tegminal venation normal, with only about 10 closed cells at corium; clavus with strong preapical bulla and acute apex; hind tibia slender, about 2× as long as hind femur (1.5× in *Apomachaerota*), with 2 lateral spines; outer apical lobe of hind tarsomere 1 hardly shorter than inner lobe.

RANGE: Philippine subregion, submontane; 1 species.

Serreia notabilis Baker Figs. 5 M–N, 8 A–E, 24G.

Serreia notabilis Bkr. 1927: 535, pl. 1 (7–12), ♀♂. Mindanao: Zamboanga (USNM).
S. notabilis var. *luzonensis* Bkr. 1927: 537, ♂. Luzon: Mt. Maquiling (type lost). **New Synonymy.**

Male: Gena proper distinctly shorter than width of lorum. Tylus hardly convex, hardly more raised than supra-antennal triangle, feebly, coarsely wrinkled, posterolaterally rounded (angulate in Baker's figure), posteriorly narrowly depressed; side piece of vertex weakly concave; supra-antennal triangle deeply, coarsely reticulate, anteriorly gently decurved; ocellar area longitudinally raised, slightly descending forwards; tentorial pit roundish, indistinct; occipital margin weakly reflexed near middle; ocellus distinctly closer to tylus than to occipital margin. Pronotum shallowly punctate and coarsely wrinkled; middle section of anterior margin forming a low, broad, transverse carina, behind which are some coarse punctures, otherwise ante-callus area fairly smooth; lateral angle broadly rounded, not reaching level of basal sclerites of closed tegmen; anterolateral margin clearly carinated, not reflexed, slightly shorter than interocular distance, angulate at its junction with anterior margin (confluent with the latter in Baker's figure). Scutellum weakly convex; disc weakly foveate and wrinkled; apical 1/4 with a transverse depression, followed by a whitish band and then a rather deep, broad sulcus partly bordered by lateral scutellar margins which are clearly carinated at that area. Tegmen smooth, with only a few coarse punctures at basicostal area, at base of clavus and along basal portions of main veins; junction of M and rm_1 (inner posterior angle of preapical cell 1) weakly bullate. Relative breadths of head, pronotum and scutellum 26 : 39 : 16. Relative lengths of hind tarsomeres (along median line in dorsal view) 7 : 3 : 6 (Baker wrote tarsomere 1=2+3). Further characters as in original description.

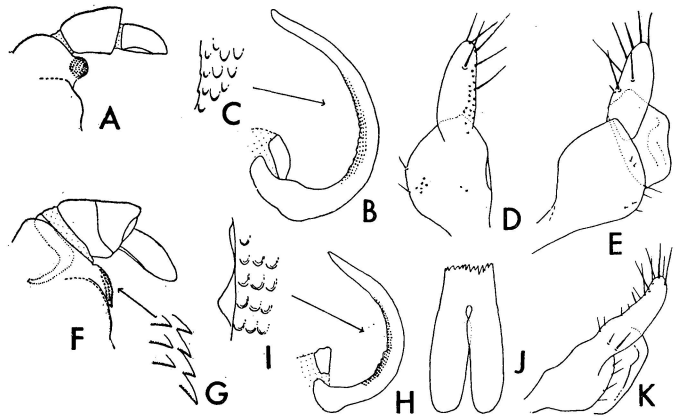

Fig. 8. *Serreia notabilis* Bkr., ♂ paratype (A-E) and *Pectinariophyes notanda* Dist., ♂ topotype (F-K). ♂ genitalia, upper part, side view (A, F); scabrous area of pygofer, sculpture (G); aedeagus and periandrium, side view (B, H); aedeagal scales (C, I); subgenital plate, apical part, dorsal view (J); paramere, inner side view (D), paramere and basal plate, outer side view (E, K). Figures drawn at different magnifications. For other species of *Pectinariophyes*, see Fig. 10.

Female: Ovipositor-sheath about 45° to horizontal plane; anal style small.

MATERIAL EXAMINED: MINDANAO: 1 ♂, 1 ♀ (USNM, syntypes), Zamboanga, S. Mindanao.

The var. *luzonensis* (type, Luzon: Mt. Maquiling) is most probably based upon a teneral specimen. Its legs were stated to be pale yellowish instead of blackish, and claval bulla "not conspicuously shining black." No further differences were noted by Baker. Since the type is lost (according to Miss L. Russell, *in verbatim*), it would be better considered as a synonym, rather than a geographical race.

I am selecting the ♀ syntype, which bears Baker's red name label, as the lecto-holotype, and the ♂ syntype, as the lecto-allotype. Baker's figures for this species are incorrect in some details. The accompanying figures of the head and pronotum are drawn from the lecto-allotype.

Genus **Machaeropsis** Melichar

Machaeropsis Mel. 1903: 137. Haplotype: *Machaeropsis valida* Mel. Wrongly spelled as *Macharopsis* by Matsumura (1940: 82).

Metaenderleinia Lallemand 1936: 265. Orthotype: *Metaenderleinia nervosa* Lall.

Body of medium size, robust, rather strongly humpbacked, about 3/4 as deep in profile as broad. Head as broad as or slightly broader than pronotum. Anteclypeus weakly convex; postclypeus broadly flattened, in ♀ slightly depressed at disc. Pleurostome 2× as broad as lorum, separated from the latter by a long deep suture; upper portion of lorum strongly acuminate, weakly tuberculate; maximum length of gena proper 2/3 of minimum breadth of pleurostome; maxillary plate hardly exposed. Eye much broader than long, its

inner margin strongly curved and subangulate at lower end; outer margin entirely not touching posterior margin of head. Tylus 1/3 as long as broad, distinctly narrower than eye, nearly as broad as side piece of vertex; supra-antennal triangle clearly defined, and together with upper portion of postclypeus, well visible in vertical view of crown. Ocelli much closer to each other than to eyes, virtually touching transverse frontal suture. Pronotum with fairly regular transverse striae; anterolateral margin only about 1/2 as long as interocellar distance, almost rounded-off. Scutellum proper about 1/4–2/5 as deep in profile as long, medially with a deep broad longitudinal excavation, submedially sharply, highly carinated, laterally abruptly descending; scutellar apex also deeply excavated, separated from scutellum proper by a low rounded transverse ridge. Tegmen short, broad, transparent, smooth all-over; veins prominent, deeply pigmented, granulated; R evenly, weakly curved, very close and subparallel to costal margin, not forming distinct subcostal triangle; abscissa 1 of M subparallel to R, thence adnate with Rs for some distance, abscissa 3 strongly diverging from Rs and stretching nearly to claval apex; apical 1/2 of Cu touching claval furrow; cells all concave; apical cell 2 trapezoid, larger than 1, 3 subtriangular, quite small; preapical cell 2 also subtriangular, but fairly large; corial appendix reaching 2/3 of apical corial margin; clavus apically acuminate, with 2 longitudinal and 1 crossvein. Hind tibia with 2 lateral spines, that near middle is about 1/2 as long as breadth of tibial apex. Female anal segment partly concealed; anal style about 1.5× profile depth at base; ovipositor-sheath vertical. Male unknown.

RANGE: Ceylonese, Indo-Chinese and Malaysian subregions, submontane; 3 species.

The scutellum of this genus is rather similar to that of *Enderleinia*, but the median excavation is shallower and wider and its bottom is by no means steeply grooved. The peculiar tegminal venation, quite short anterolateral pronotal margin, broad eyes and absence of basicostal triangle in tegmen make *Machaeropsis* a quite distinct genus. The tegmen drawn by Melichar and E. Schmidt is about 2.5× as long as broad with R not close and subparallel to costal margin. These are incorrect. Distant's figure of the same is proportionally too elongate.

KEY TO SPECIES OF MACHAEROPSIS

1. Scutellum proper (*i. e.*, excl. apical depressed part) in profile with depth to length about 2 : 5; discal excavation of scutellum smooth, without distinct sculpture, deepest at posterior end and separated from apical fovea by a transverse, abruptly high bar; basal margin of apical cell 3 of tegmen only 1/3–1/2 as long as apical cell 1; body ♀ only 6 mm long; tegmen without apical fascia; pronotum with only 2 transverse lines, otherwise unmarked ..... **nervosa**

   Scutellum proper in profile with depth to length about 1 : 3–1 : 4; discal excavation of scutellum distinctly rugose, deepest at or near center, separated from apical fovea by a low transverse bar which gently descends into the excavation and fovea; basal margins of apical cells 1 and 3 of tegmen about equal in length; body ♀ 7.5–10 mm long 2

2. Tylus much longer than interocellar distance; preapical transverse bar of scutellum not crossed by median fovea; tegmen apically with broad brown fascia; pronotum with only 2 red transverse lines on and near anterior margin, otherwise unmarked ..... **valida**

Tylus slightly shorter than interocellar distance; preapical transverse bar of scutellum crossed by median fovea; tegmen without apical brown fascia (veins brown); pronotum posteriorly with red hieroglyphic lines, in addition to 2 transverse red lines at anterior part ..... **rubrilineata**

Machaeropsis nervosa (Lallemand) 1936, n. comb.

Metaenderleinia nervosa Lall. 1936: 265, fig. 1.

Female: Crown largely smooth (side piece of vertex anteriorly irregularly rugose), transversely depressed, particularly at outer side of ocellus; tylus with fine longitudinal striae, anteriorly with a broad high transverse carina; ocellar area about as long as interocellar distance. Pronotum with undulating intersecting rugae near lateral angle, with some punctures. Other characters as in key to species (see above) and original description. Body 6 mm long.

MATERIAL EXAMINED: N. BORNEO: Holotype ♀ (BMNH), Bettotan nr. Sandakan.

As shown in the key, this species differs from the other 2 in being smaller in size and in having a higher and differently sculptured scutellum and smaller apical cell 3 of tegmen. But the venational scheme and other characters are basically the same as in its congeners.

Machaeropsis valida Melichar

Machaeropsis valida Mel. 1903: 138, pl. 4 (19), ♀.—Distant, 1907: 84, fig. 67 (redescr.).

Female: Crown rather roughly irregularly rugose, almost plane; tylus punctate, anteriorly very weakly carinate. Pronotum with rather shallow intersecting rugae and few coarse punctures. Discal excavation of scutellum slightly deeper than in *rubrilineata*. Hind tibia with 2 lateral spines but basal one poorly developed, tubercle-like and not darker than ground color (hence both Melichar and Distant described as having only 1 lateral spine). Other characters as in key to species (see above) and Distant's description. Body 9–10 mm long.

MATERIAL EXAMINED: CEYLON: 2 ♀♀ (BMNH), Maskeliya.

In both Melichar's and Distant's figures, the eye is about as long as wide in dorsal and facial views. This is incorrect. Although the eye in *valida* is comparatively less compressed than in *rubrilineata*, it is decidedly wider than long when viewed from any angle. The type, ♀, from Ceylon (no further details), not seen by me, is probably in the Berlin Mus.

Machaeropsis rubrilineata Maa, n. sp. Figs. 3B, 5 O–P, 24H.

Female: Head brownish yellow; postclypeus with a large black oblong mark at disc, 9 brown transverse lines at each side and a brown median line below the black mark and extending to anteclypeus; lower portion of gena brownish black; crown with 2 red transverse lines, one along anterior carina of tylus and another along transverse frontal suture and extending to eyes. Pronotum dirty green, with 5 red lines, 2 of them transverse, running along and next to anterior margin respectively, 1 along median line, 1 sublateral and somewhat U-shaped; posterior 1/2 of posterolateral margin broadly brownish black. Scutellum brown, its submedian carina apically whitish. Tegmen clear hyaline; veins brown

to black; main veins with black granules which are slightly broader than veins; corial and claval appendices brown. Lateral and ventral surfaces and abdominal tergites largely ochraceous; venter of mesothorax black; femora and tibiae all striped with brownish black; hind tibial and tarsal spines apically black.

Postclypeus rather smooth, its blackened area finely densely punctate; lateral rugae indistinct except by color; gena finely striated. Crown weakly, irregularly rugose; side piece of vertex slightly depressed; tylus transversely raised, without distinct sculpture, separated from postclypeus by a distinct but not sharp transverse carina; tentorial pit transverse, quite indistinct; ocellar area flat, wider than long; occipital margin reflexed. Pronotum with deep, dense, non-intersecting, transverse striae; no punctures; calli all transverse, quite shallow and close to anterior pronotal margin; posterolateral margin rather deeply sinuate. Scutellum proper about 1/4 as deep in profile as long, faintly, transversely striate; its discal excavation much wider than tylus, deepest at center. Relative lengths and breadths of head, pronotum and scutellum 15 : 31 : 36 and 53 : 50.5 : 23 respectively. Body length 7.5 mm; tegmen 6.1 mm long, 2.65 broad.

THAILAND: Holotype ♀ (TCM), Chiengmai, NW Thailand, 13. V. 1940, R. Takahashi.

The red hieroglyphic markings on the head and pronotum are quite distinctive for this species. Its pronotal sculpture and tegminal venation are similar to those in *valida* and *nervosa*.

Genus **Neuroleinia** Lallemand

Neuroleinia Lall. 1936: 266. Orthotype: *N. collarti* Lall.

Body rather small and slender, strongly humpbacked. Head as broad as pronotum. Anteclypeus strongly convex at median area; postclypeus in ♀ gently and evenly convex, in ♂ with a large (about as wide as lorum), deep, sharply-rimmed depression near top; pleurostome about 1.5× as wide as lorum; maxillary plate well exposed. Crown short; tylus 1/2 as long as wide, distinctly narrower than side piece of vertex and only about 1/2 as wide as an eye; supra-antennal triangle posteriorly poorly defined, well visible in vertical view of crown. Pronotum transversely punctate-rugose; anterolateral margin as long as or slightly longer than interocellar distance. Tegminal venation much simplified, as figured in original description and described in key to genera (see above); claval vein simple at basal 1/2, branched at apical 1/2, with branch 1 forked at its extreme apex; corial appendix reaching 3/5 of apical corial margin. Other characters as in *Machaeropsis*.

RANGE: Malaysian subregion, lowland; 1 species.

Neuroleinia is clearly a derivative of *Machaeropsis* and the general structure is closely similar to the latter genus. Its tegminal venation however is unique for the family and facilitates its unmistakeable recognition. The strong sexual dimorphism in the postclypeus is parallel to *Hindola*, to which it has little affinities. The ♂ of *Machaeropsis* is not yet known but presumably it shows similar dimorphism.

Neuroleinia collarti Lallemand

Neuroleinia collarti Lall. 1936: 266, fig. 2.

Female: Head as wide as pronotum. Median 1/3 of postclypeus longitudinally striate;

rugae at lateral area indistinct. Crown smooth; ocellus much closer to tylus than to occipital margin; ocellar area slightly longer than wide, scarcely raised at middle; tentorial pit inconspicuous; tylus about 2.5× as wide as long, transversely depressed, anteriorly weakly carinate, posteriorly much more raised than ocellar area; side piece of vertex strongly, transversely depressed; occipital margin strongly reflexed, gently curved. Pronotum coarsely, shallowly punctate-rugose; ante-callus area smooth, strongly raised like a yoke; median carina weak; posterior margin deeply sinuate. Scutellum weakly rugose; its discal depression very extensive, widest near base. Body 6.5 mm long.

Male: Color slightly darker, pale fascia at posterior part of pronotum much narrower. Crater-like depression of postclypeus about as long as wide. Relative widths of head and pronotum 48 : 49. (Genitalia not examined.) Body 5.5 mm long.

MATERIAL EXAMINED: N. BORNEO: Holotype ♀ (BMNH ex Lallemand coll.), allotype ♂ (BMNH ex F. M. S. Mus.), Bettotan nr. Sandakan, 25. VII. 1927, C. Boden Kloss & H. M. Pendlebury. Both specimens bear the author's handwritten label "*Neuroleina* [sic] *transversa* Lall." In the ♂ specimen, here designated as allotype, the locality label is printed and gives also, on the back, date and collectors' names, and the word "paratype" is written on the determination label. In the ♀ specimen, the locality label is handwritten, without giving date and collectors' names, and the status of its being the type is only indicated by a printed red label.

In addition to venational peculiarity, the color pattern of this species is unusual too. The dorsum of the body is brownish black, with 3 conspicuous ivory-white arcuate fasciae at anterior part of crown, along anterior pronotal margin, and at posterior part of pronotum respectively. The last one is very broad, starts from the anterolateral margin, curves caudad and meets posterior pronotal margin at middle. The lateral rim of the discal scutellar excavation is also ivory-white.

Genus **Enderleinia** E. Schmidt

Enderleinia E. Schmt. 1907: 167. Orthotype: *E. bispina* E. Schmt.

Body of medium size, robust, strongly humpbacked, nearly as broad as deep in profile. Head much narrower than pronotum. Anteclypeus weakly keeled near upper end; postclypeus evenly convex. Pleurostome broader than lorum, separated from the latter by a deep long oblique suture; maximum length of gena proper and minimum breadth of pleurostome subequal; maxillary plate slightly exposed. Eye about as long as broad, its inner margin curved and distinctly angulate at lower end; outer margin not touching hind margin of head. Tylus much narrower than eye, distinctly broader than side piece of vertex; supra-antennal triangle poorly defined; ocelli much closer to each other than to eyes. Pronotum coarsely, irregularly reticulate, with no distinct punctures except at lateral corner; anterolateral margin carinate. Scutellum proper about 1/2 as deep in profile as long; median area broadly, abruptly, deeply excavated; submedian area strongly carinated laterally abruptly descending; scutellar apex low, slightly convex, in contact with closed tegmina, separated from scutellum proper by a weak transverse depression. Tegmen rather short and broad, hyaline, virtually smooth throughout; punctures only found at sides of veins and along costal margin and fine ones few scattered in basal cell (E. Schmidt wrote: "auf der ganzen Fläche sehr fein punktiert, am Costalrande und auf den Nerven deut-

licher"); veins strong, deeply pigmented; venation rather normal; basicostal triangle narrow; apical cells rather short, separated from preapicals by a continuous, almost straight crossvein ($ir+rm_2+mcu_2$); preapical cell 2 bullate at middle; veins Rs and M hardly curved, Cu slightly curved towards claval furrow near middle and apex; clavus apically acuminate, with 2 longitudinal veins adnate for some distance near middle; corial appendix reaching 2/3 of apical corial margin. Hind tibia nearly 2× as long as hind femur, with 2 lateral spines, the major one 1/2 as long as breadth of tibial apex; inner and outer apical lobes of hind tarsomeres subequal in length. Female anal segment well exposed; anal style 2× as long as profile depth at base; ovipositor-sheath nearly vertical. Male unknown to me.

RANGE: W. and E. African subregions, lowland; 2 (possibly 1) species.

This genus probably serves as a connecting link between the 2 major groups of the tribe and bears some affinities with *Machaeropsis* on the one hand, and with *Neuromachaerota* on the other. Since these 3 genera are found at both sides of the Indian Ocean, *Enderleinia* also serves as one of the links of the Ethiopian and Oriental faunae. Evidences showing its affinities toward *Machaeropsis* are the deeply excavated scutellum, the proximity of subcosta to costal margin and the continuous preapical crossvein of the tegmen. Meanwhile the depth and steepness of the scutellar excavation of *Enderleinia* reach the extreme in the family and readily distinguish it from any other genera.

KEY TO SPECIES OF ENDERLEINIA

Tegmen colorless, with 3 short, narrow, brownish black fasciae at base, middle and apex respectively; wing enfumed behind longitudinal vein 4 ..... **bispina**

Tegmen dominantly brown; white on spot between R and M before middle, along costal margin beyond middle, on 3 spots of corium and on 2 spots of anal margin; wing evenly enfumed all-over..... ***fumipennis**

Enderleinia bispina E. Schmidt Figs. 5 Q–R, 24I.

Enderleinia bispina E. Schmt. 1907: 169, fig. 1, ♂♀.

Female: Color variable, shining black in fully matured specimens and reddish brown in teneral ones; upper portion of postclypeus, raised areas of crown, reticulation-rims of pronotum, and extreme base and apex of scutellum proper all yellow or brownish yellow; venter of body, legs and abdominal tergites largely brownish black; side of thorax gray; scutellar apex brown; tegmen brownish at extreme base, with 3 brownish black fasciae: middle one very narrow, running from costal margin and then along mcu_1, apical one covering all or most of apical cells 2 and 3; clavus with a blackish or brownish spot near apex; veins brownish to blackish; corial and claval appendices blackish.

Postclypeus coarsely, irregularly rugose, with indistinct lateral transverse rugae. Crown punctate, with a smooth, very deep depression between ocellar area and side piece of vertex; ocellus much closer to tylus than to occipital margin, the latter weakly reflexed; ocellar area medially raised; tentorial pit small, roundish, shallow. Pronotum with reticulation-meshes irregularly arranged and of uneven size; median carina fairly strong; lateral corners with few punctures; calli large, deep. Scutellum proper coarsely, shallowly punctate; submedian carina slightly widened at both extremities, and with inner and outer walls almost perpendicular to each other in caudal view; scutellar apex smooth. Relative lengths and

breadths of head, pronotum and scutellum 16 : 36 : 38 and 43 : 51 : 22 respectively. Body length 7.8–8.4 mm, tegmen 6.5–7.3.

MATERIAL EXAMINED: IVORY COAST: 4 ♀♀ (TVR), Adoipodoumé, 1. II. 1957, P. Dessart; 1 ♀ (BMNH), Ashanti Distr., 7. III. 1913, A. E. Evans. UGANDA: 1 ♀ (CAS), 9.8 km NE of Kaberamaido, 1175 m, 12. X. 1957, E. S. Ross & R. E. Leech.

This species is also found in Togo (type locality), and former French West and Equatorial Africa. The unique ♀ from Uganda is much paler than those from Ivory Coast and possibly represents a geographic race. The types, not seen by me, from Togo : Misahöhe and Bismarckburg, are in Berlin Mus.

***Enderleinia fumipennis** E. Schmidt

Enderleinia fumipennis E. Schmt. 1924: 289, ♀. Type, Kamerun (no further details)(WSW).

The tegmen of this species was said to be longer and narrower than in *bispina* (7.5× 3.0 mm against 6.5×3.5). In all the *bispina* specimens before me, the tegmen is about 2.5× as long as broad and this is also true for E. Schmidt's figure for the same species. Hence *bispina* is inseparable from *fumipennis* in tegminal shape, and the true status of the latter is pending on the discovery of the ♂ and comparisons of further material.

Genus **Neuromachaerota** E. Schmidt

Neuromachaerota E. Schmt. 1912: 175. Orthotype: *N. vosseleri* E. Schmt.

Body of medium size, slender, strongly humpbacked in ♀, about 4/5 as deep in profile as broad. Head slightly narrower than pronotum. Anteclypeus anteriorly weakly keeled; postclypeus evenly convex. Pleurostome more than 2× as broad as lorum; maxillary plate exposed; maximum length of gena proper distinctly less than minimum breadth of pleurostome. Eye slightly shorter than broad, its inner margin almost straight, angulate at lower end; outer margin practically touching hind margin of head. Tylus much narrower than eye, slightly broader than side piece of vertex; supra-antennal triangle poorly defined, well visible in vertical view of crown; ocelli closer to each other than to eyes. Pronotum coarsely rugose or punctate-rugose; anterolateral margin almost rounded-off. Scutellum proper about 1/5–1/4 as deep in profile as long, almost entirely occupied by an oboval deep depression, the margin of which is not sharply rimmed; scutellar apex foveate. Tegmen hyaline, rather short and broad, basally punctate, apically smooth; veins rather strong, venation similar to that in *Enderleinia*; discal bulla of corium weaker; claval veins irregular, sometimes with several crossveins in between, 1A apically always branched and tumescent; subcostal triangle narrow; corial appendix reaching 1/2 of apical corial margin. Hind tibia with 2 lateral spines, the major one about 1/2 as long as breadth of tibial apex; inner and outer apical lobes of hind tarsomeres subequal in length. Female anal segment well exposed; ovipositor-sheath vertical.

RANGE: E. and S. African subregions; 3 species.

KEY TO SPECIES OF NEUROMACHAEROTA

1. Tegmen lacking brown granules and apical fascia; clavus with a black tumescent triangular mark near apex; pronotum with undulating and intersecting rugae but usually lacking distinct punctures. Body length ♂ 5.0–5.5 mm, ♀ 5.5–6.6...**discigutta**

Tegmen with numerous brown granules and a broad brown apical fascia; clavus lacking such a black mark; pronotum punctate-rugose or with a short median carina 2

2. Tegmen hyaline, basally brown and coarsely punctate, not transparent, apically broadly brown; hind margin of clavus ochraceous; face lacking black markings. Body length ♂ 6.5 mm ..... ***vosseleri**

Tegmen semitransparent, hind margin of clavus yellowish, corium with a large dull brown speck near basicostal triangle and 2 dull brown fasciae before apical 1/3 and on apical margin respectively; face largely black. Body length ♀ 8.5 mm ..... ***obscurior**

***Neuromachaerota obscurior** Jacobi

Neuromachaerota obscurior Jac. 1922: 2, ♀. Type, Tanganyika: Tandala (DDN).

***Neuromachaerota vosseleri** E. Schmidt

Neuromachaerota vosseleri E. Schmt. 1912: 178, 1 fig. (unnumbered), ♂. Type, Tanganyika: Amani (ZMB).

Neuromachaerota discigutta Maa, n. sp. Figs. 5 S–T, 9 A–D, 24J.

Female: Greenish yellow, with the following black markings: broad transverse patch at each side of postclypeus, most part of pleurostome, lower 1/2 of gena proper, extreme apex of scutellum, cross band on lateral surface of metathorax and on venter of fore femur, basal abdominal tergites, fore and mid tarsi and last tarsomere of hind leg. Tegmen hyaline, pale yellowish; basal 1/3 unevenly, weakly enfumed; costal margin whitish, semitransparent; clavus unevenly enfumed, extreme base, hind margin and triangular area enclosed by branches of claval vein 1 which are all black; when both tegmina closed, this triangular area forms a conspicuous diamond-shaped mark together with the black apex of scutellum; veins brown, lacking brown granules, but whitish, semitransparent punctures.

Postclypeus microsculptured, its lateral transverse rugae indistinct; suture between ante- and postclypeus definable only at sides. Crown smooth and rather shining; with very deep depression between ocellar area and side piece of vertex; tylus transversely depressed, longitudinally striated; tentorial pit round, very shallow; ocellus much closer to tylus than to occipital margin, the latter hardly reflexed; ocellar area weakly convex. Pronotum coarsely, shallowly rugose, slightly reticulated, with no distinct punctures and median carina; calli all transverse, rather deep, very close to anterior pronotal margin. Scutellum proper more weakly rugose than pronotum; discal depression about 1/2 as broad as scutellum proper at base, 2× as long as broad, deepest at center, broadest before middle; scutellar apex much lower than scutellum proper, flattened, posteriorly weakly foveate. Tegmen punctate along costal margin and at basal cell and clavus, punctural interspaces mostly 1/2 of punctural diameter; apical and preapical cells concave, smooth; 2 claval veins, joined by 1 short crossvein. Relative lengths and breadths of head, pronotum and scutellum 10 : 24 : 28 and 38.5 : 39 : 17 respectively (E. Schmidt wrote: "Schildchen etwas kürzer als das Pronotum" for the genus). Body length 5.5–6.6 mm, tegmen 4.7–5.7.

Male: Similar. Black mark on postclypeus larger, lateral frontal suture more broadly black, dull markings on tegmen more conspicuous. Tylus smooth, not striated. Pronotum less humpbacked, with a short median carina near anterior margian. Relative lengths

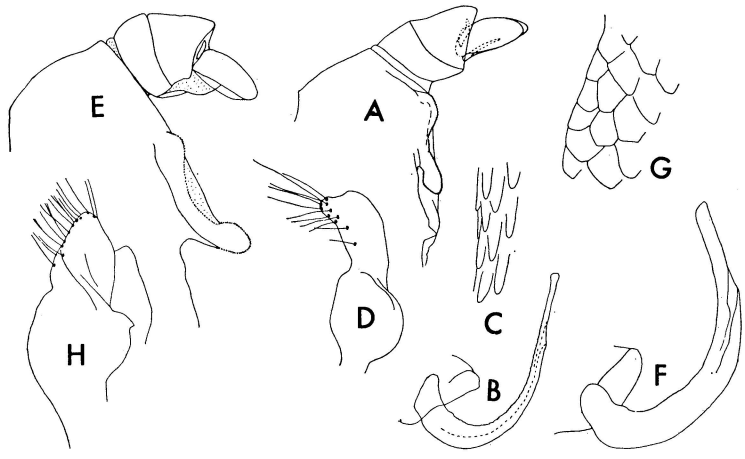

Fig. 9. *Neuromachaerota* and *Polychaetophyes* spp., ♂ genitalia, upper part, side view (A, E); aedeagus and periandrium, side view (B, F); aedeagal scales (C, G); paramere (D); paramere and basal plate (H). A–D, *N. discigutta* Maa, paratype; E–H, *P. serpulidia* Kirk., neallotype. All except C and G in same magnification.

and breadths of head, pronotum and scutellum 10 : 21 : 22 and 31.5 : 32 : 15 respectively. Body length 5.0–5.5 mm, tegmen 4.2–4.7.

TRANSVAAL: Holotype ♀ (PTR), Rustenburg, 6. I. 1944, A.L. Capener; allotype ♂ (PTR), same data but XI. 1949; 2 ♀♀ (PTR), Zoutpan (=Salt Pan), 40 km NW of Pretoria, 4–10. II. 1929, G. van Son; 1 ♀ (PTR), same data but 16. V. 1931. S. RHODESIA: 2 ♂♂, 1 ♀ (PTR), Victoria Fall Camp, Zambesi River, 3–4. V. 1954, A. J. T. Janse; 1 ♂ (PTR), Lundi River Bridge on the national road, 115 km SW of Fort Victoria, 3. IV. 1954, A. J. T. Janse. N. SOUTHWEST AFRICA: 1♂ (PTR), Otijwarongo Distr., III. 1950, G. Hobohm; 1♀ (PTR), same data but XII. 1949.

Although salient structural characters of *N. obscurior* and *N. vosseleri* are hardly known, the more southernly distributional range, the relatively smaller size, and the characters mentioned in the key should make this new species easy to separate from the other two.

This species is rather variable in color and the above description is taken from average specimens. The palest example is a ♀ from SW Africa which may prove to be a distinct subspecies. The size is about as small as ♂♂ from Victoria Falls Camp (♂♂ from different localities do not show much size-variation), and the crown, pronotum, scutellum and tegmen are uniformly pale and lack any dark markings, although the shining black markings on postclypeus and metanotum are quite conspicuous. The darkest example is a ♂ from Lundi River Bridge which may represent another subspecies. The basal 1/2 of the tegmen is uniformly black, the other 1/2 is practically unmarked except for a brownish spot slightly apicad to the tegminal center, the pronotum is evenly tinted with brownish and with few rather distinct punctures at center. On the other hand, the single small ♀ from Victoria Falls Camp mentioned above is also rather pale, the markings on the tegmen are pale brownish and inconspicuous (that near the apex of clavus nearly

black), the scutellar apex brownish and the crown uniformly pale (but postclypeus with conspicuous black markings). The 3♀♀ from Zoutpan are all of similar size as the holotype, but the pronotum is adorned with 4 longitudinal brown stripes and the submedian areas of the scutellum are as black as scutellar apex.

Genus **Polychaetophyes** Kirkaldy

Polychaetophyes Kirk. 1906: 384. Logotype: *P. serpulidia* Kirk., designated by E. Schmidt 1912: 173. Wrongly spelled by Metcalf (1952: 228) as *Polychaetopyhes.*

Body of medium size, robust, strongly humpbacked, about 7/10 as deep in profile as broad. Head much narrower than pronotum. Anteclypeus not keeled; postclypeus flat, not foveate. Pleurostome broader than lorum, with short fine decumbent hairs; its lower end plane, with a long suture to separate it from lorum; maximum length of gena proper and minimum breadth of pleurostome subequal; maxillary plate hardly exposed. Eye about as long as wide; inner margin strongly curved outward and subangulate at lower end; lower end of outer margin almost in contact with hind margin of head. Tylus distinctly narrower than eye, about as broad as side piece of vertex. Supra-antennal triangle poorly defined. Ocelli much closer to each other than to eyes. Pronotum coarsely rugose; anterolateral margin sharply carinate. Scutellum low, medially flattened, weakly elevated at sides, no preapical constriction; its apex weakly depressed. Tegmen hyaline, densely punctate at basal 2/5; cells at apical 1/2 all smooth and fairly concave; veins strong; venation normal, similar to that in *Taihorina* and *Hindola*; corial appendix reaching 3/5 of apical tegminal margin; clavus apically acute. Hind tibia with 2 lateral spines, the major one shorter than 1/2 of breadth of tibial apex; outer and inner apical lobes of hind tarsomeres as in *Taihorina.* Female anal segment almost entirely concealed; anal style as long as profile depth at base; ovipositor-sheath vertical.

RANGE: Australian subregion, lowland; 1 species.

Polychaetophyes serpulidia Kirkaldy Figs. 3C, 5 U–V, AA, 9 E–H, 24K.

Polychaetophyes serpulidia Kirk. 1906: 385, pls. 23 (12) & 30 (9), excl. pl. 27(9).

Female: Postclypeus convex, with dense, moderately coarse punctures; lateral area strongly descending, with about 11 transverse impressed lines (including 5 on tylus). Gena and lorum densely, longly haired and moderately coarsely punctate; relative breadths of pleurostome and lorum and length of gena proper 4.5 : 3 : 3. Crown irregularly punctate-rugose; occipital margin strongly reflexed; tylus somewhat flattened; side piece of vertex nearly plane, anteriorly rounded off to antennal ledge; tentorial pit roundish, very shallow; ocellus distinctly closer to tylus than to occiput; ocellar area strongly raised at middle. Pronotum with intersecting, strong rugae, no distinct punctures; ante-callus area slightly depressed, finely rugose, and with a distinct submarginal furrow running parallel to anterior margin; lateral area irregularly punctate-rugose; posterior margin very broadly sinuate at middle. Scutellum moderately convex, wrinkled; discal depression large, longer than wide; apical 1/4 smooth, weakly concave, laterally weakly reflexed. Tegmen coarsely, very densely and deeply punctate at basal 2/5 and along costal margin, elsewhere very sparsely so; costal cells and longitudinal veins with scattered brown granules which are slightly wider than veins; basicostal depression rather shallow. Relative lengths of pronotum and

scutellum 32 : 32; relative breadths of head, pronotum and scutellum 38 : 50 : 22. Body length 6–8 mm.

Male: Similar. Tegmen paler. Relative lengths of pronotum and scutellum 30 : 30; relative breadths of head, pronotum and scutellum 34 : 46 : 21. Body length 6.5 mm.

MATERIAL EXAMINED: QUEENSLAND: Holotype ♀ (HSPA #378), Bundaberg, XI. 1904; 1♀ (BISHOP, ex W. M. Giffard coll.), Prince of Wales I., Cape York Is., VIII. 1920, J. A. Kusche; 1 ♀ (CJD), Innisfail, VI. 1930, L. Franzen; neallotype ♂ (BISHOP 3211), Bundaberg, 1. X. 1904; 1♀ (HSPA), Bundaberg, 30. X. 1904, A. Koebele; 1♂, 1♀ (BMNH ex Lallemand coll.), same data; 1 newly emerged ♀ and its last nymphal exuvia (HSPA), no locality or collector label. The last 5 specimens almost certainly form a part of the type series.

S. AUSTRALIA: 2♀♀ (AM, #K 45397, #K53680), no further details.

HOST PLANT: *Eucalyptus* sp. (Myrtaceae).

In the HSPA collection, there are 3 lots of subconic nymphal tubes. They are separately pinned and bear no labels but have been figured in the original description of this species. Most probably they have been wrongly associated with the adults. The type ♀ is in very good condition.

The tegmen in this species is somewhat variable both in color and in venational details. The brownish fascia at middle is usually small and much interrupted, but may combine with the apical fascia, cover the whole apical 1/2 of the tegmen, and leave a very narrow colorless fascia near the base. Apical cells 1 and 3 may each have a supernumerary crossvein, the former is sometimes transversely divided into 2 cellules.

The genus was misplaced by Metcalf (1960: 24) under Hindoloidini, and the specific name was wrongly spelled by Baker (1927: 544) and others as *serpulida*.

Genus **Taihorina** Schumacher

Taihorina Schum. 1915: 84. Orthotype: *Taihorina geisha* Schum.
Aphromachaerota Lallemand 1951: 84. **New Synonymy.** 1 sp. included, no type designation.
Trichophyes Lall. 1951: 85. **New Synonymy.** 1 sp. included, no type designation.

Body of medium size, robust, usually strongly humpbacked, about 8/11 as deep in profile as broad. Anteclypeus weakly keeled; postclypeus evenly convex in ♀, usually tuberculate in ♂. Pleurostome narrower than lorum, with long fine decumbent hairs, separated from lorum by a long suture; maximum length of gena proper subequal to minimum breadth of pleurostome; maxillary plate hardly exposed. Eye and tylus same as in *Apomachaerota*. Supra-antennal triangle fairly definable. Ocelli closer to each other than to eyes. Pronotum punctate or striate-punctate; anterolateral margin not carinate. Scutellum almost plane, normal, its apex slightly depressed. Tegmen about 2× as long as broad, semitransparent, densely punctate throughout, apical 1/2 evenly convex; veins obscure; venation normal, with 2–4 apical and 2–4 preapical cells; Rs and M evenly, gently curved, Cu far away from claval furrow; clavus apically acute; claval vein variable; corial appendix reaching 1/8–1/2 of apical tegminal margin. Hind tibia with 2 lateral spines, the major one hardly longer than 1/2 of apical tibial breadth. Outer apical lobes of all hind tarsomeres subequal in length to corresponding inner lobes. Female anal segment well exposed; anal style 2.5–3× as long as profile depth at base; ovipositor-sheath vertical or nearly so.

RANGE: Indo-Chinese and Malaysian subregions, extending to Manchurian subregion, lowland and submontane; 3 species.

Without seeing any actual specimens of *Taihorina* and realizing its major differences from *Hindola*, Baker (1927: 539) hastily reduced the former into synonymy. Lallemand (*l. c.*) accepted this misinterpretation and brought forth 2 new haplotypic genera which are technically invalid since no type designations have ever been made.

KEY TO SPECIES OF TAIHORINA

1. Tegmen slightly less than 2× as long as wide; corial appendix scarcely larger than claval appendix; side piece of vertex deeply depressed and its outer margin more raised than eye; surface of crown quite roughened; gena proper much shorter than minimum width of pleurostome; body ♂ 4.5 mm long ..... **batangana**
   Tegmen nearly 2.5× as long as wide; corial appendix not less 2× as long as claval appendix; side piece of vertex not or hardly depressed and its outer margin not more raised than eye; surface of crown scarcely sculptured; gena proper nearly as long as minimum width of pleurostome 2
2. Tegminal vein R unbranched; breadth of head greater than length of pronotum; posterior pronotal margin hardly sinuate; postclypeus (♂) evenly convex, not protuberant or keeled; body length 4.5–4.7 mm ..... **simplex**
   Tegminal vein R branched near apex; head breadth not greater than pronotum length; posterior pronotal margin subangulately sinuate at middle; postclypeus (♂) with a distinct central protuberance above which is a feeble keel; body length 5.5–7.5 mm ..... **geisha**

Taihorina geisha Schumacher Figs. 5 W–X, 10 A–D, 24L.

Taihorina geisha Schum. 1915: 85. Type, Taiwan: Taihorin.
Makiptyelus fasciatus Kato 1928: 35, pl. 2 (4), ♀. Type, Taiwan: Arisan (TCM).
Neuromachaerota becquarti Liu 1942: 5, pl. 1, ♀. Type, Kiangsu: Chinkiang (type lost) **New Synonymy.**
Taihorina tomon Matsumura 1942: 82, ♀. Types, Kirin: Tomonrei; Korea: Rasin (SPR).
Hindola robusta Jacobi 1944: 24, ♀. Type, Fukien: Kuatun (type formerly in Dresden Mus., destroyed in war).
Hindola geisha, Maa 1947: 8 & 21, pl. 1 (1, 2), ♀♂ (redescr.)
Aphromachaerota adusta Lallemand 1951: 84. Type, Kweichow: Pinfa (BMNH) **New Synonymy.**
Hindola geisha + *Aphromachaerota adusta*, Metcalf 1960: 10, 21.

Punctures on dorsum of body and on tegmen darker than ground color in ♂ and, sometimes, in ♀ also. Anteclypeus weakly keeled at lower 2/3; postclypeus in ♂ strongly protuberant at center and feebly keeled at upper portion and in profile, distinctly angulate; that in ♀ evenly convex and in profile not angulate near middle. Tylus transversely depressed, separated from postclypeus by a weak transverse carina; side piece of vertex finely punctate, depressed; supra-antennal triangle smooth or punctate; tentorial pit triangular, shallow; ocellar area medially raised, 2/3 as long as broad; ocellus slightly closer to tylus than to occipital margin; occipital margin feebly reflexed behind tentorial pit, gently sinuate at middle. Pronotum covered with rather shallow punctures arranged in irregular transverse

rows, but hardly any definable transverse striae; punctural interspaces of same row mostly slightly greater (when punctures moderately coarse) to 2 or more times greater (when punctures fine) than punctural diameter; median carina usually absent, seldom feebly indicated near anterior margin; anterolateral margin almost straight; posterolateral margin weakly sinuate; posterior margin subangulately sinuate at middle. Scutellum similarly sculptured as pronotum, discal depression broad, quite shallow; apex slightly convex. Tegmen more deeply, coarsely punctate than pronotum, punctures at basal 1/3 slightly sparser and unevenly distributed; those at pale discoidal fascia sparser than at basal 1/3; apical angle rounded; vein R branched near apex, apical cell 1 much smaller than 2 and 3; costal and apical margins lined with a series of brown or black granules; basicostal triangle shallowly depressed, moderately broad; corial appendix rather variable in size, reaching lower 1/4–2/5 of apical corial margin. Segments 1–2 of hind tarsus subequal in length, inner and outer apical lobes of segment 2 also subequal. Body length ♂ 5.5–6.0 mm, ♀ 6.5–7.5.

MATERIAL EXAMINED: KOREA: 1 ♀ (WSW), Diuyr ad Chongjin, 24. VIII. 1959, B. Pisarski & J. Proszynski. TAIWAN: 2♂♂ (BISHOP), Puli, IX. 1949 & VII. 1954, Gressitt & native coll'r; 1♀ (TCM, holotype of *Makipt. fasciatus*, compared with type of *Aphromachaerota adusta* Lall. by W. E. China), Arisan, 10. X. 1922, M. Kato; 1♀ (BISHOP), wrongly labelled as New Guinea. KIANGSU: 1♀ (BISHOP), Chinkiang, 10. VI. 1924, J. F. Illingworth. KWEICHOW: 1 ♀ (BMNH, holotype of *adusta*) Pinfa. VIETNAM: 1 ♀ (BISHOP), Blao, 600 m, 21. X. 1960, C. M. Yoshimoto.

Also recorded from Fukien, Liaoning and Kirin.

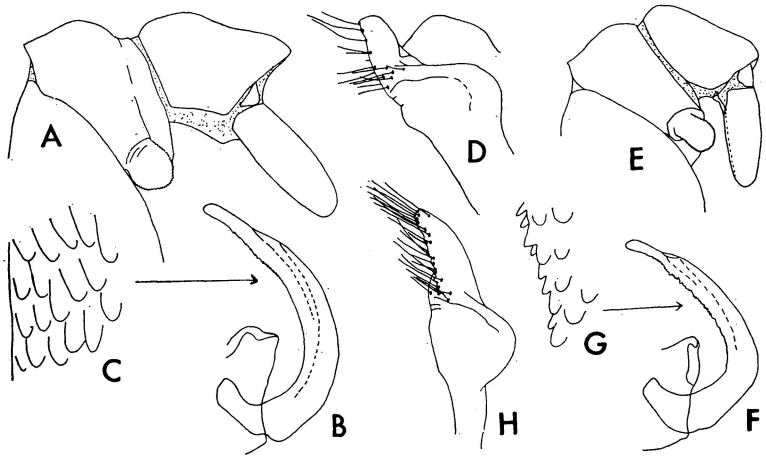

Fig. 10. *Taihorina* spp., ♂ genitalia, upper part, side view (A, E); aedeagus and periandrium, side view (B, F); aedeagal scales (C, G); paramere, side view (H); paramere and basal plate (D). A–D, *geisha* Schum. from Taiwan; E–H, *simplex* Maa, holotype. All except C and G at same magnification.

HOST PLANTS: *Quercus dentata* Thunb., *Q. glauca* Thunb. (Fagaceae).

The ♀♀ from Chinkiang and Arisan have exceedingly fine and scattered punctures on pronotum and scutellum, and in the former, the punctures on tegmen are not darker

than ground color. On the other hand, in the ♀♀ from Blao and New Guinea, which are rather heavily punctate on pronotum and scutellum, a few of the dark points superposing tegminal punctures are slightly diffused and granule-like. The "New Guinea" ♀ differs from other specimens also in having corial appendix only 1/4 as long as apical corial margin. The pale discal fascia is well defined only in the ♀ from Arisan.

Taihorina batangana (Lallemand), n. comb.

Trichophyes batangana Lall. 1951 : 85.

Male: Maximum length of gena proper hardly more than 1/2 minimum width of pleurostome. Crown very heavily sculptured; side piece of vertex quite strongly depressed; supra-antennal triangle punctate, posteriorly sharply defined. Pronotum deeply punctate, punctural interspaces of same row mostly smaller than punctural diameter; median carina recognizable only by color. Scutellar punctures finer and sparser than pronotal ones, rather even in distribution, not arranged in transverse rows. Tegmen slightly shorter than distance between postclypeal protuberance and scutellar apex (56 : 59), less than 2× as long as wide (56 : 30), evenly covered with rather coarse punctures and dark granules; punctures at apical 1/3 almost confluent but hardly darker than ground color; those at basal 2/3 distinctly so; granules of several sizes, found on or near veins; corial appendix hardly longer and wider than claval appendix, reaching about 1/5 of apical corial margin; colorless fascia narrow, lying just across middle of tegmen (in *geisha* and *simplex*, basad to midpoint of tegmen). Relative lengths and widths of head (incl. postclypeal protuberance), pronotum and scutellum 22 : 46 : 57 and 46 : 76 : 39 respectively. Other characters similar to that in *geisha* (genitalia not examined). Body 4.5 mm long.

MATERIAL EXAMINED: MALAYA: Holotype ♂ (BMNH), Batang Padang, Perak.

Lallemand described the costal and apical terminal margins in this species as being angulate to each other. This is not true as the general outline of the tegmen in all species of the genus is similar except the relative length and width. In size, *batangana* approaches *simplex* but its structure is apparently closer to *geisha*, notably the development of the postclypeal protuberance in ♂ and the radial furca.

Taihorina simplex Maa, n. sp. Figs. 5 Y–Z, 10 E–H, 24M.

Male: Similar in color pattern and structure to *geisha*. Breadth of head greater than length of pronotum (24.5 : 21; in *geisha*, 31 : 32). Postclypeus evenly convex, lacking any trace of keel or tubercle and in profile, not angulate near middle. Tylus not depressed, anteriorly rounded off into postclypeus. Pronotum more distinctly shorter than broad (21 : 35; in *geisha*, 32 : 49.5), anterolateral margin proportionally shorter, posterior margin very gently sinuate at middle. Tegmen extensively brown at basal 1/3; vein R unbranched. Body length 4.5 mm.

Female: Similar to ♂, paler. Body length 4.7 mm.

VIETNAM: Holotype ♂ (BISHOP 3212), 20 km S of Dalat, 1300 m, 12. IX. 1960, Gressitt; allotype ♀, same data.

This species can be conveniently recognized from *geisha* by its much smaller size and in ♂, evenly convex postclypeus. The only criterion for both sexes appears to be the shape of pronotum and the unbranched radius. The name *simplex* refers to that vein and the normal postclypeus (♂).

The pronotum and scutellum in the holotype are richly marked with brown and are coarsely, rather densely punctate, whereas in the allotype, they are almost uniformly greenish yellow and very finely and scatteredly punctate. These probably represent individual rather than sexual variation.

Genus **Makiptyelus** Maki

Makiptyelus Maki 1914: 354 (not intended as orig. descr., authorship credited to Matsumura). Haplotype: *Makiptyelus dimorphus* Maki.

Makiptyelus Matsumura 1940: 40 (as n. gen.). Orthotype: *Makiptyelus dimorphus* Matsumura.

Body of medium size, slender, about 3/4 as deep in profile as broad. Anteclypeus keeled at extreme lower end; postclypeus evenly convex in both sexes. Pleurostome with short fine decumbent hairs, its minimum breadth nearly 1/2 of maximum length of gena proper. Tylus as broad as eye, 1/2 broader than side piece of vertex; supra-antennal triangle poorly defined. Pronotum coarsely rugose reticulate; anterolateral margin sharply carinated, weakly reflexed. Tegmen nearly transparent, almost 3× as long as broad; basicostal triangle narrow; apical cells slightly concave; veins Rs and M strongly bent analward near apex; corial appendix reaching 2/3 of apical tegminal margin; claval vein apically branched. Female anal segment partly concealed; anal style 1/2 longer than profile depth at base. Further characters similar to *Taihorina*.

RANGE: Indo-Chinese subregion, lowland; 1 species.

This genus serves as a connecting link between the *Polychaetophyes* and *Hindola* subgroups of the tribe. It can be easily distinguished from other narrow-headed Enderleiniini by the slender and moderately humpbacked body and elongate tegmen. In the scheme of tegminal venation, it is quite close to *Hindola* but the basicostal triangle is much narrower and the radius proportionally closer to the costal margin.

Makiptyelus dimorphus Maki Figs. 3D, 5 BB–CC, 24N.

Makiptyelus dimorphus (Matsumura *in litt.*) Maki 1914: 354, fig. (unnumbered), pl. 17 (1–16), ♂♀ (not intended as orig. descr., authorship accredited to Matsumura). Type: Taiwan: Taipei (TARI).

Hindola dimorpha, Maa 1947: 10 & 26, pl. 1 (3), ♂♀ (redescr.)

Postclypeus strongly convex, minutely punctate. Crown deeply punctate, irregularly wrinkled; tylus convex, anteriorly rounded off into postclypeus; side piece of vertex hardly depressed; tentorial pit roundish, shallow; ocellar area as long as broad, medially raised; ocellus equidistant to tylus and occipital margin; occipital margin gently curved, reflexed behind each tentorial pit. Pronotum shallowly reticulate, meshes of reticulation finer at anterior portion, mostly slightly broader than long; median line often very feebly furrowed at anterior portion and keeled at posterior portion; anterolateral margin straight; posterolateral margin weakly curved; posterior margin subangulately sinuate at middle. Scutellum more finely reticulate than pronotum, with feeble indication of wrinkles; disc slightly concave; apex flattened. Tegmen coarsely, deeply, densely punctate at clavus and basal 2/3 of corium, rather sparsely so at distal area of preapical cells; apical cells irregularly wrinkled, not punctate; basicostal triangle rather deeply depressed; vein R branched be-

yond middle of tegmen, R_1 closer to costal margin rather than to Rs, abscissa 2 of M parallel to Rs, rm often with an oblique stub which may reach R and form an extra cell before preapical cell 1; apical cells 1 and 2 each longer than broad, 2 larger than 1 and 3. Segment 1 of hind tarsus and outer apical lobe of segment 2, respectively, slightly shorter than segment 3 and inner apical lobe of segment 2. Body length ♂ 5.0–5.5 mm, ♀ 6.0–6.5.

MATERIAL EXAMINED: TAIWAN: 1♂ (BMNH), "Formosa", M. Kato; 1♀ (TCM), Taihoku, 27. IV. 1927, Kato.

HOST PLANT: *Celtis sinensis* Pers. (Ulmaceae).

As indicated above, Maki (*l. c.*) had no intention of publishing this genus and species as new before Matsumura did. But his rather detailed descriptions and illustrations of all stages validated both the generic and specific names and their authorship must be accredited to him. In Matsumura's works, the species has been quite briefly described and crudely figured in 1917 and 1931 and the authorship accredited to himself, but he never indicated it as new. The genus was not formally described as new by him until 1940. On this occasion, by overlooking the fact that Maki was already the first describer of the genus and species, he once again acclaimed himself as the author of the species.

Neuromachaerota becquarti Liu was once suggested by me (1947: 12) to be a synonym of this species. The type was lost. On the basis of its original description and our present knowledge of the distribution of this group, *becquarti* is certainly a synonym of *Taihorina geisha* Schum. instead.

This species was wrongly listed by Haku (1937: 70) from Korea, and by Metcalf (1960: 10) from Japan.

Genus **Labrosyne** Maa, n. gen.

Orthotype: *Labrosyne longipes* Maa, n. sp.

Body of medium size, robust, weakly humpbacked, about 4/5 as deep in profile as broad. Head hardly narrower than pronotum, exceptionally short, anteriorly broadly rounded. Anteclypeus weakly keeled, 1/2 longer than broad; postclypeus evenly, very weakly convex. Rostral apex nearly reaching posterior margin of hind coxa. Pleurostome 1/2 broader than lorum, separated from the latter by a deep long suture; upper end of lorum tuberculate, narrowly rounded; maximum length of gena proper 2/3 of minimum breadth of pleurostome; maxillary plate well exposed. Eye much broader than long, its inner margin nearly straight for its full length, acutely angulate at low end; outer margin touching posterior margin of head. Crown unusually short, with median and side lengths subequal, strongly transversely depressed and separated from face by an arcuate carina; tylus about 1/6 as long as broad, much narrower than eye, broader than side piece of vertex; supraantennal area clearly defined, tetragonal, as long as broad, with outer margin hardly shorter than inner margin; upper portion of this tetragonal area and of postclypeus well visible in vertical view of crown. Ocellus touching transverse frontal suture; interocellar distance less than 1/2 of interocular distance. Pronotum sparsely punctate; anterior margin gently arcuate; anterolateral margin 1/2 as long as ocello-ocular distance, round-off; posterolateral and posterior margins distinctly sinuate. Scutellum discally weakly concave, basilaterally hardly elevated. Tegmen 2.5× as long as wide, semitransparent, gently con-

vex, coarsely, sparsely punctate all-over; veins indistinct, R very close and gently, evenly convergent basad to costal margin and branched beyond middle of tegmen, M and Cu close and subparallel to Rs and claval furrow respectively; apical cell 1 basally quite narrow, apically open; 2 large, longer than broad; 3 broadly subtriangular; preapical cell 1 elongate, 2 basally open; corial appendix large, almost reaching tegminal apex; clavus apically acute, with 2 complete longitudinal veins, but no crossveins. Legs exceptionally long and slender; hind leg as long as tegmen; hind tibia longer than head and pronotum together, with 2 lateral spines, that near middle is about 1/2 as long as breadth of tibial apex; segment 1 of hind tarsus subequal in length to 2+3, dorsomedian length of segment 2 much greater than length of its apical lobe. Female anal segment partly concealed; ovipositor-sheath vertical. Male unknown.

RANGE: Indo-Chinese subregion, submontane; 1 species.

This outstanding genus looks like a jassid. Its head is so short and rostrum and legs so long that it would not be mistaken for any other machaerotids. The tetragonal and well defined supra-antennal area and the entirely independent claval veins are not found in other genera of the family. The name is derived from the Greek *labrosyne*, greedy (feminine gender), and is given in allusion to the long rostrum and short head.

Labrosyne longipes Maa, n. sp. Figs. 3E, 6 A–B, 26H.

Female: Greenish ochraceous (? greenish in life); face and venter of thorax and of fore and mid legs much paler, with a little greyish tint; scutellum with a long triangular whitish marking at basilateral corner and apex; hind leg, fore and mid legs (excl. venter), and abdomen, all brown; rostral apex, a spot on venter of fore femur and spines of hind tibia and tarsus black. Tegmen brownish.

Body shining, lacking distinct hairs except on legs. Anteclypeus with fine short wrinkles at side; postclypeus minutely punctate, with hardly definable transverse lines at sides; gena proper shortened at both ends; pleurostome also minutely punctate. Crown smooth; tylus strongly descending caudad; ocellar area as long as interocellar distance, medially elevated; tentorial pit shallow, transverse; occipital margin weakly reflexed. Pronotum rather evenly covered with moderate-sized punctures, punctural diameters mostly much smaller than punctural interspaces; calli transverse, indistinct. Scutellum feebly, coarsely wrinkled throughout, with few punctures near side; basilateral area feebly descending ectad; apical area slightly flattened. Tegmen with costal margin slightly concavely curved at basal 1/3; subcosta deeply concave. Body length 7.4 mm; tegmen 6.3 mm long, 2.5 broad.

VIETNAM: Holotype ♀ (BISHOP 3210), 20 km S of Dalat, 1300 m, 12. IX. 1960, Gressitt.

Genus **Pectinariophyes** Kirkaldy

Pectinariophyes Kirk. 1906: 386. Haplotype: *Pect. pectinaria* Kirk. (syn. of *Carystus stalii* Spgbg.). Wrongly spelled as *Pectinarophyes* by Lallemand (1912: 10) and Baker (1919: 67, 68).

Xenaias Distant 1916: 198. **New Synonymy.** Orthotype: *Xenaias notandus* Dist.

Polytrichophyes E. Schmidt 1919: 366. **New Synonymy.** Orthotype: *Polychaetophyes aequalior* Kirk. (syn. of *Carystus stalii* Spgbg.)

Neurohindola Lallemand 1951 : 87. **New Synonymy.** Orthotype : *Carystus reticulatus* Spgbg.

Body of medium to rather large size, rather slender. Postclypeus almost evenly convex in both sexes, seldom with a short weak keel or fovea near top. Crown almost plane or depressed, irregularly rugose ; supra-antennal triangle more or less definable, usually well visible in vertical view of crown. Pronotum strongly punctate or with undulating and intersecting rugae, never transversely striate. Scutellum low, weakly convex at disc. Tegmen subhyaline (rarely heavily sclerotized), strongly punctate throughout; veins usually weak ; venation rather variable in details, R often branched before middle, Rs and M apically gently curved, never suddenly bent analward ; clavus usually with 2 longitudinal and 1 or more crossveins ; corial appendix often remnant, never noticeably larger than claval appendix and never more than 1/3 as long as apical corial margin ; apical cells not or hardly depressed. Hind tibia with 2 lateral spines, the 1st one often much smaller than any apical tibial spine. Further characters similar to *Hindola* and *Chaetophyes.*

RANGE : S. African, Ceylonese, Philippine, Malaysian, Papuan and Australian subregions, mostly submontane ; 8 species.

As pointed out elsewhere in the paper, this is one of the weak genera which form the *Hindola*-subgroup of the tribe. It is mainly characterized by the strong pronotal and tegminal punctuation, small corial appendix and weak sexual dimorphism. The names *Xenaias* and *Neurohindola* merely represent extreme forms of the genus and are here sunk as synonyms. In certain respects, they may be perhaps retained as subgenera, but such a practice would lead to unnecessary additions of subgeneric names for housing other species-groups.

In the British Museum collection, specimens of *P. reticulata* Spgbg. ex V. Lallemand collection stand under the genus *Metamachaerota* which is a manuscript name of Lallemand and was later published by him as *Neurohindola.*

Our present knowledge of the genus shows that it has a wide but discontinuous distribution. The discovery of further species in the future may close some of the gaps and may necessitate some modification of the concept of the genus. The 8 species enumerated below are tentatively segregated into 4 species-groups, the characters of which are given in the key.

(1) *reticulata* group : Australian and Papuan subregions, lowland ; 3 species : *reticulata* Spgbg., *stalii* Spgbg., *antica* Jacobi. The last species is of doubtful status.

(2) *notanda* group : Ceylonese and Philippine subregions ; 3 species : *notanda* Dist., *luzonensis* Bkr., *basicostalis* n. sp. The first 2 are submontane forms and the last is a lowland form and an anomalous member of the group.

(3) *rudinotum* group : Malaysian subregion, submontane ; 1 species : *rudinotum* n. sp.

(4) *hyalinipennis* group : S. African subregion, submontane ; 1 species : *hyalinipennis* Stål.

KEY TO SPECIES OF PECTINARIOPHYES

1. Corial appendix of tegmen remnant, only about 1/2 as long and broad as claval appendix ; basicostal triangle broad, its breadth hardly smaller than distance to claval furrow and distinctly largar than distance to vein M+Cu ; lateral spine near base of hind tibia remnant (*notanda* group) 2

Corial appendix well developed, subequal in size to claval appendix; basicostal triangle narrow, its breadth distinctly smaller than distance to claval furrow and never greater than distance to M+Cu 4

2 (1). Tegmen hardly more than 2× as long as broad, with a large black mark at basal 1/3, R branched beyond middle of tegmen; body length (♂) only 4.9 mm ..... **basicostalis**

Tegmen not less than 2.5× as long as broad, unicolored, R branched before middle of tegmen; body length in both sexes not less than 6 mm..... 3

3 (2). Anterior 1/2 of pronotum proper with rather fine, slightly undulating but not distinctly intersecting transverse striae; apical and preapical cells of tegmen not depressed; ♂ olive green, its arcuate carina separating crown from face weakly developed; ♀ lacking distinct median carina on pronotum ..... **luzonensis**

Anterior 1/2 of pronotum proper coarsely reticulate-rugose; apical and preapical cells of tegmen slightly depressed; ♂ dark brown, with distinct arcuate carina separating crown from face; ♀ with distinct median carina on pronotum..... ..... **notanda**

4 (1). Tylus only 1/4 as long as broad and much shorter than ocellar area; anterolateral margin of pronotum only about 1/2 as long as interocellar distance; supra-antennal triangle subequal in length to ocellar area; ocellar area about 1/2 as long as broad (*rudinotum* group)..... **rudinotum**

Tylus not less than 1/2 as long as broad and always longer than ocellar area; anterolateral margin of pronotum about as long as interocellar distance..... 5

5 (4). Anterior pronotal margin subangularly produced at middle; supra-antennal triangle about 1/2 or 2/3 as long as ocellar area; segment 3 of hind tarsus distinctly shorter than 1+2; lateral spine near base of hind tibia greater than smallest spine at apex (*hyalinipennis* group)..... **hyalinipennis**

Anterolateral margin of pronotum broadly rounded at middle; supra-antennal triangle as long as interocellar area; segment 3 of hind tarsus subequal in length to 1+2; lateral spine near base of hind tibia hardly developed, smaller than smallest spine at apex (*stalii* group) 6

6 (5). Tegmen with preapical cell 2 evenly broad, basally open; body length ♀ 5.5 mm..... ***antica**

Tegmen with preapical cell 2 basally narrowed and/or closed..... 7

7 (6). Ocellar area 1/2 as long as broad; tegmen with few or no supernumerary crossveins, R branched behind middle (very rarely at middle) of costal margin, M often convergent to or adnate with Rs near middle, Rs evenly curved; body size smaller, ♀ tegmen 4.7–5.8 mm long..... **stalii**

Ocellar area 2/3 as long as broad; tegmen with numerous supernumerary crossveins (ir from 2–11, rm 3–9, mcu 3–6, not counting ambient vein), R branched before middle of costal margin, Rs and M subparallel, both often zigzagged; body size larger, ♀ tegmen 6.6–8.0 mm long..... **reticulata**

Pectinariophyes reticulata (Spångberg), n. comb. Figs. 3 F–G, 11 A–F, 25A.

Carystus reticulatus Spgbg. 1877: 12, ♀ (not ♀♂).
Hindola reticulata, Kirkaldy 1906: 387 (list).
Neurohindola reticulata, Lallemand 1951: 88 (list).

Female: Postclypeus moderately convex, minutely punctate, medially broadly, very slightly flattened and with few fine indistinct longitudinal striae, laterally with about 8 broad shallow transverse impressed lines. Gena and lorum minutely punctate, with indistinct longitudinal striae; relative breadths of pleurostome and lorum and length of gena proper 7 : 3 : 5. Side piece of vertex coarsely, deeply, obliquely wrinkled; tentorial pit oblong, moderately deep; supra-antennal triangle about 2.5× as broad as long, depressed; occipital mar-

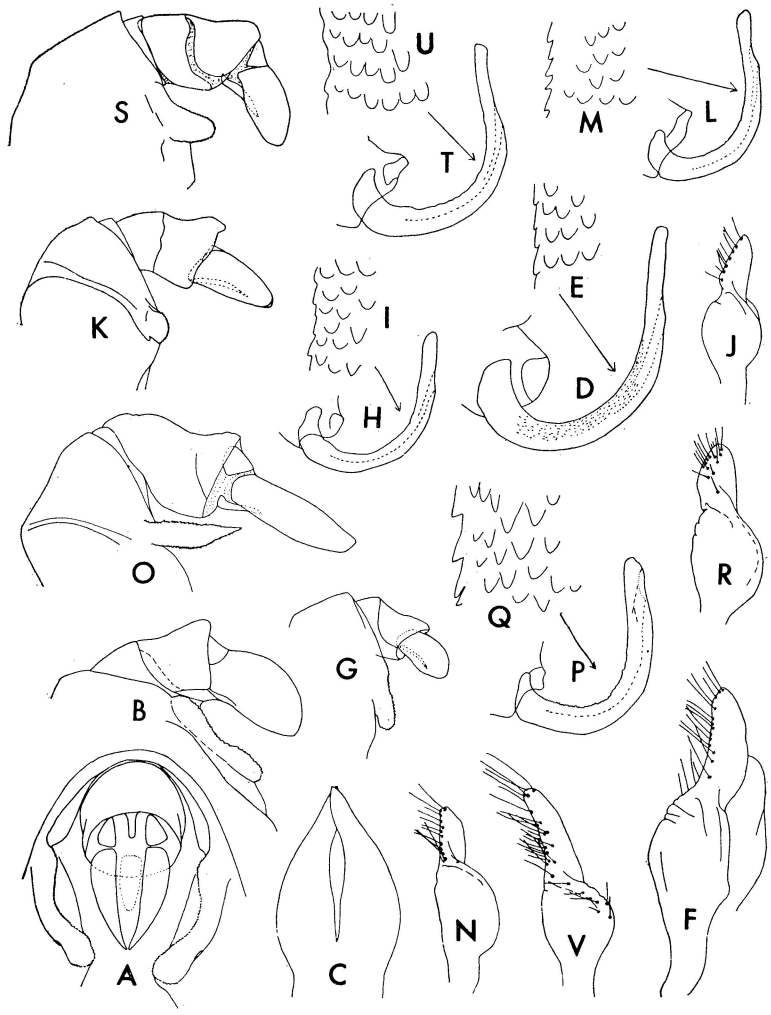

Fig. 11. *Pectinariophyes* spp., ♂ genitalia, upper part, hind view (A); same, side view (B, G, K, O, S); subgenital plate (C); aedeagus and periandrium, side view (D, H, L, P, T); aedeagal scales (E, I, M, Q, U); paramere, side view (F, J, N, R, V; basal plate partly shown in F). A–F, *reticulata* Spgbg., neallotype; G–J, *stalii* Spgbg.; K–N, *basicostalis* Maa, paratype; O–R, *rudinotum* Maa, holotype; S–U, *hyalinipennis* Stål (for *P. notanda* Dist., see fig. 7 F–K). All except aedeagal scales drawn to same magnification.

gin slightly reflexed; tylus flattened or weakly depressed, shallowly, irregularly rugose, more than 2× as broad as long; ocellar area with indistinct median carina; area immediately outside of ocellus depressed. Pronotum coarsely punctate-reticulate, with meshes at anterior 1/2 fairly deep, often darker than ground color and about as long as wide, becoming coarser, wider (approximately 2/3 as long as wide), shallower and same as ground color toward posterior pronotal margin; anterior marginal area narrowly, shallowly depressed; calli shallow. Scutellum coarsely, rather shallowly wrinkled throughout; apical 1/3 flattened. Tegmen coarsely punctate all-over; apical and preapical cells practically plane; veins fairly prominent, ir, rm and mcu crossveins about 2–10, 4–9 and 3–6 in number respectively (not counting ambient vein); R branched before middle of costal margin; Rs subparallel to C nearly for entire length; clavus with 2 longitudinal and 1–2 crossveins, longitudinal vein 2 basally indistinct; corial appendix slightly shorter and narrower than claval appendix. Relative lengths and breadths of head, pronotum and scutellum 15 : 37 : 44 and 53 : 54 : 25.5 respectively (measured from holotype). Body length 8–11 mm, tegmen 6.6–8 mm.

Male (undescribed): Similar. Slightly darker; tegmen apically stained brown. Relative lengths and breadths of head, pronotum and scutellum 12 : 35 : 35 and 45 : 44.5 : 20 respectively. Body length 8.1 mm, tegmen 6.8.

MATERIAL EXAMINED: QUEENSLAND: Holotype ♀ (STK), Austral. boreal., G. Thorey; 1♀ paratype (STK), Cape York, G. Thorey; 2♀♀ (AM), Cunnamulla Dist., II. 1943, N. Geary; 2♀♀ (AM), Pentland, VIII–X. 1942, J. G. Brooks. N. S. WALES: Neallotype ♂ (CSIRO), Nelson Bay, 12. XI. 1960, I. F. B. Common & M. S. Upton; 1 ♀ (CJD), Springbrook, I.1934, L. Franzen; 1♀ (AM), Sydney, 6. I. 1916, A. R. McCulloch; 1♀ (BISHOP), Sydney, XI. 1902, R. Helms; 1♂ (BMNH ex Lallemand coll.), National Park, Lea; 1♂ (USNM), Illawarra, H. Petersen. W. AUSTRALIA: 1♀ (SAM), La Grange, 27. VII. 1953, N. B. Tindale.

The single ♀ from Cape York originally bore no name label but almost certainly represents the supposed ♂ of *Carystus reticulatus* by Spångberg. The mistake is rather clear. He wrote "♂: long. corp. 5.5 mm, long. corp. c. tegm. 8 mm, lat. 3 mm. ♀: long. corp. 7 mm, long. corp. c. tegm. 11 mm, lat. 4 mm. Patria: Australia borealis ad Cape York." These measurements well correspond with the Cape York specimen and the type of *reticulatus*.

The holotype differs from the paratype and other ♀ specimens examined in having body size noticeably larger, supra-antennal triangle shorter, side piece of vertex more depressed, pronotum proportionally broader (32/40.5 as long as broad in paratype) and with comparatively stronger sculpture. With so scanty material at hand, it is doubtful whether such differences mean more than seasonal or individual variation.

Pectinariophyes stalii (Spångberg), n. comb. Figs. 2C, 3H, 11 G–J, 25 B–C.

Carystus Stålii Spgbg. 1877: 12, ♂♀. Type, Australia borealis et occidentalis (STK). Emended by Kirkaldy (1906: 387) to *stali*.

C. sorurculus Spgbg. *l. c.*, ♂. Type, Australia borealis et occidentalis (STK). **New Synonymy.** Emended by Lallemand (1912: 73) to *sororculus*.

Polychaetophyes aequalior Kirkaldy 1906: 385. Type, Queensland: Bundaberg (HSPA). **New Synonymy.**

Pectinariophyes pectinaria Kirk. 1906: 386, pl. 27 (8). Type, Queensland: Bundaberg

(HSPA). **New Synonymy.**

Hindola stali (sic)+*H. sorurculus*, Kirk. 1906: 387 (list).

Polytrichophyes aequalior, E. Schmidt 1919: 367 (list).

Polychaetop'ıyes aequalior+*Pectinarophyes* (sic) *pectinaria*, Lallemand 1912: 10 (list).

Hindola sororculus (sic)+*H. Stålii*, Lall. 1912: 73 (list).

H. aequalior (p. 8)+*H. pectinaria*+*H. sorurcula* (p. 12)+*H. stâlii* (p. 13), Metcalf 1960: 8, 12–13.

Female: Greenish yellow, rarely yellowish brown. Postclypeus brown, with about 10 transverse impressed brownish black lines at each side (incl. 2 on tylus), the upper ones narrower and paler. Pronotal punctures, especially those at anterior 1/2, slightly darker than ground color. Venter of mesothorax largely brown. Fore tibia and femur brown, tarsus and extreme apex of tibia black. Mid leg black, knee brown. Hind leg brown, darker toward apex, tibial and tarsal spines apically shining black.

Postclypeus finely and rather densely punctate; rugae at intervals of impressed lines rather prominent and about as broad as latter; lower area with fine feeble transverse striae; discal area with few short fine longitudinal striae. Pleurostome and lorum densely, minutely punctate; relative breadths of pleurostome and lorum and length of gena proper 5.75 : 3.5 : 4. Crown coarsely, shallowly, irregularly wrinkled; tylus slightly flattened, distinctly more elevated than side piece of vertex; the latter weakly concave; tentorial pit large, roundish, scarcely depressed; ocellar area depressed, anteriorly a little more elevated than tylus; occipital margin strongly reflexed throughout; supra-antennal triangle depressed, about 2/3 as long as broad. Pronotum strongly convex, coarsely and deeply reticulate-punctate, with meshes approximately as long as broad; calli shallow. Scutellum coarsely rugose, often with distinct punctures intermixed; apical 1/5 feebly foveate. Tegmen coarsely reticulate-punctate throughout; venation variable in details, R branched beyond middle of costal margin, very rarely at middle; R_1 usually divergent from costal margin near apex; ir 2–4 in number, all far from base of preapical cell 1; rm_1 short or replaced by adnation of Rs and M near middle; preapical cell 3 basally often with 1–2 supernumerary oblique stubs or crossveins; basicostal triangle weakly depressed; preapical and apical cells in teneral specimens distinctly concave, in fully matured ones almost plane; corial appendix as large as or slightly smaller than claval appendix. Relative lengths and breadths of head, pronotum and scutellum 10 : 27.5 : 30 and 39 : 40 : 17 respectively. Tegmen 4.7–5.8 mm long.

Male: Duller than ♀, clavus and apical corial margin of tegmen tinted with yellowish brown to dark brown. Postclypeus with short weak keel near top. Scutellum more coarsely and deeply sculptured. Tegmen 3.4–4.3 mm long.

MATERIAL EXAMINED: QUEENSLAND: 1♂ (holotype of *stalii*) (STK), Austral. boreal., G. Thorey; 1♂ (holotype of *sorurculus*) (STK), same data; 1♂ and last nymphal exuvia (holotype of *pectinaria*) (HSPA 380), rearing #2307, lacking place or collector's label; 1♂ (STK), Australia, coll. Dämel; 1♀ (holotype of *aequalior*) (HSPA 379), Brisbane, XI. 1904; 1 ♀ (STK), Cape York, G. Thorey, here selected and labeled as lecto-allotype of *stalii*; 4♀♀ and numerous nymphal tubes (CJD), Brisbane, 23–25. IX. 1922, H. Hacker; 1♀ (USNM, ex F. W. Goding coll. #26), H. Welb; 2 ♀♀ (AM), Cunnamulla, II. 1943, N. Geary; 1♀ (SAM), Brisbane, 5. X. 1924; 2 ♀♀ (SAM), Victoria Pk., Brisbane Dist., 24. I. 1922, L. Franzen; 1♀ (SAM), Toowanq, Brisbane Dist., XI. 1921, L. Franzen. N. S. WALES: 11♂♂, 7♀♀, 1 intetsex (USNM), Botany Bay, H. Petersen; 1♂ (AM), Como,

nr. Sydney, 6. XII. 1923, A. Musgrave & T. Campbell; 4♂♂ (CSIRO), Trangie, 20. X. 1949 E. F. Riek; 1♀ (CSIRO), 100 km NW of Nyngan, 21. X.1949, E. F. Riek; 1♀ (CSIRO), Nelson Bay, 12. XI. 1960, I. F. B. Common & M. S. Upton; 1♂ (CSIRO), Glen Innes, 25. XI. 1960, M. F. Day & N. E. Grylls; 19♂♂, 11♀♀ (CSIRO), Black Mt., nr. Canberra, at mercury vapor trap, 29. XI. 1960–31. I. 1961, I. F. B. Common; 1 stylopized ♀ (NMV), Yarra Yarra Ck., Riverina Distr., 5. I. 1933, A. Musgrave; 1♂, 1♀ (OXF, coll. Westwood), "NH" [Nova Hollandia]. VICTORIA: 3♀♀ (NMV), Porepunkan, 26. I. 1960, A. Neboiss. S. AUSTRALIA: 1♀ (SAM), Burnside, 8. XI. 1884, J. G.O. Tepper. TASMANIA: 1♀ (BMNH), Tasman Pen., XII. 1940, J. W. Evans. SE NEW GUINEA: 3♀♀ (PMB), Lawes Rd., Port Moresby, at light, 5. III. 1959, Mrs. E. Anderson; 1 stylopized ♂ (OXF), Milne Bay, Waigani, Samari, V. 1913, G. M. Carson.

Besides the above listed, 1♀ (USNM), from Dendenong and 1 ♀ (CSIRO), 26 km S, of Smithton, Tasmania, 8. I. 1948, K. H. L. Key & P. B. Carne are tentatively referred to this species.

There is some doubt regarding the authenticity of the type of *aequalior*, since the type locality was originally given as Bundaberg, not Brisbane, but in the HSPA collection, there are no further specimens referable to *aequalior* or *pectinaria*.

Since very briefly described by their authors, *stalii*, *sorurculus*, *aequalior* and *pectinaria* have only appeared in subsequent catalogs and their true status has long been problematic. A direct comparison of their types and other material at hand revealed no definite structural difference and I have no doubt that these 4 names represent the same species. Spångberg (*l. c.*) distinguished his *sorurculus* from *stalii* by, in addition to color pattern, "minor et pronoto antice valde magis rotundato praeter notas supra illatus diversa." In the type of *stalii*, it is true that the anterior pronotal margin is distinctly angulated and a little upraised at middle. In the type of *sorurculus* and some other ♂ examined, the same margin is more or less rotundate and the Dämel ♂ has slight indication of such an angulation. The type of *sorurculus* is seemingly shorter than that of *stalii*, since the head of the former is glued on the pronotum (Spångberg gave 5 and 6 mm respectively for their body length). Measurements of their tegmina by using a micrometer proved that both are 4.25 mm long. The color patterns of the types of *stalii* and *pectinaria* are similar to each other and are noticeably paler than other ♂, for instance, the transverse impressed lines on postclypeus and punctures on pronotum are brownish (not brownish black), and the tegmen has an indistinct yellowish (not distinctly brown) apical fascia. Furthermore, the type of *aequalior* is much darker than nearly all other specimens, perhaps due to post mortem changes. The type of *pectinaria* is a teneral newly-emerged reared specimen. In short, all these are interspecific variations.

The types of the 4 "species" are all in fairly good condition, but in *sorurculus*, the scutellum is slightly damaged at base, the abdomen shrivelled, and the right wing rolled and stuck together; in *pectinaria*, the scutellum is not yet fully extended; in *aequalior*, the tegmina and wings of both sides are greasy and partly stuck together, thus giving a false appearance as if there is a distinct broad brown apical fascia.

This and the preceding species are quite close to each other in color and structure and both show certain extent of variation in size, color and structural details. Ranges of their size, venational characters, distribution, and seasons of appearance of adults all more or less overlap and their differences enumerated in the key may be fallable for odd ♀

specimens. The 19♂♂ and 11♀♀ from Black Mt. nr. Canberra are rather uniform in size and venation, but examples from Queensland and SE New Guinea are usually larger than those from the south. The single ♀ from Tasmania is unusually large and has 4 ir, 2 rm and 1 mcu crossveins. The single ♂ from Trangie, on the other hand, has an unusual dark tegmen, a brownish fascia near middle, basal 1/2 of clavus greenish yellow, apical 1/4 of corium and apical 1/2 of clavus dark brown. Further long series of specimens from different localities and different seasons may answer the question whether there exists 2 or more seasonal or geographic races.

*__Pectinariophyes antica__ Jacobi

Pectinariophyes antica Jac. 1922: 3, figs. 1, 1*a*, ♀. Type, NE New Guinea: Astrolabe Bay, Erima (BDP).

This species is known from one unique ♀ and may prove to be identical with, or a geographic race of, *stalii*. Metcalf (1960: 8) wrongly listed the type locality as Dutch New Guinea.

Pectinariophyes notanda (Distant), n. comb. Figs. 6 C–D, 8 F–K, 25D.

Xenaias notandus Dist. 1916: 198, fig. 152.—China IN Baker 1927: 545, pl. 4 (2) (descr. notes).

Male: Postclypeus finely, sparsely punctate; lateral impressed lines broad, indistinct; median carina broad and hardly discernible at upper 1/3. Lorum almost 1/2 as wide as pleurostome; gena proper slightly shorter than width of the latter; all finely obliquely rugose. Anteclypeus feebly wrinkled, convex, not keeled. Tylus concave, its anterior margin angulate or subangulate at middle; side piece of vertex concave; supra-antennal triangle depressed, punctate, very short; tentorial pit large, roundish, indistinct; occipital margin reflexed; ocellar area gently descending forward, not distinctly raised, ocellus much closer to occipital margin than to tylus. Pronotum with ratio of length to breadth as 23 : 32, coarsely rugose-reticulate, meshes deep, mostly 1.5–2.0× as wide as long, rims not sharp, about 1/4 as wide as meshes; ante-callus area, as in tylus, shallowly, irregularly wrinkled; calli deep, large, confluent to one another; median carina feeble; anterolateral margin carinated throughout, hardly longer than interocellar distance. Scutellum more shallowly rugose-reticulate than pronotum, flattened or slightly depressed at disc; posterior 1/2 with 7–8 feeble rugae, no distinct punctures. Tegmen about 2.5× as long as broad (75: 29) (Distant wrote "rather more than three times as long as broad"), with coarse, unusually deep punctate-reticulation throughout, meshes mostly 4–6× as wide as rims; apical cells and basal 1/2 of preapical cells weakly concave; basicostal depression shallow; veins rather prominent; venation as figured by China (*l. c.*), rather variable, rm_1 (inner border of preapical cell 2) usually ill-defined, occasionally apical cell 2 longitudinally subdivided and preapical cell 3 apically with a triangular cellule. Hind tibia with 2 lateral spines, the basal one quite small but distinct. Relative breadths of head, pronotum and scutellum 29.5 : 32 : 12.5. Body length 6 mm.

Female: Similar. Postclypeus not keeled. Crown and pronotum with a faint and well defined median carina respectively. Tylus and side piece of vertex less depressed than in ♂. Color paler. Body length 7 mm.

MATERIAL EXAMINED: S. INDIA: 3♀♀ (BMNH, syntypes), Nilgiri Hills, T. V. Camp-

bell; 2♂♂ (USNM), same data. One of the ♀ syntypes is selected by me as lectotype.

Pectinariophyes luzonensis (Baker), n. comb. Figs. 6 E–F, 25E.

Hindola luzonensis Bkr. 1927: 540, pl. 2 (22–24), ♂.

Female (undescribed): Postclypeus not keeled. Relative widths of lorum and pleurostome and length of gena proper 3 : 5 : 3.5. Crown coarsely, irregularly punctate-rugose at tylus, supra-antennal triangle and outer 1/2 of side piece of vertex, elsewhere micro-sculptured (Baker wrote "All parts of surface of crown with very coarse, obtuse, irregular wrinkles"); tylus hardly depressed at disc (Baker wrote "rather strongly depressed"), anteriorly rounded-off to postclypeus, posteriorly highly raised above level of ocellar area; supra-antennal triangle fairly long, poorly defined from side piece of vertex which is concave; tentorial pit roundish, shallow; ocellar area clearly raised medially, gently descending forward; ocellus equidistant to tylus and occipital margin. Pronotum shallowly punctate-rugose, punctures less distinct than rugae; ante-callus area finely, densely rugose; submedian callus roundish, shallow; lateral and sublateral ones transverse, deep; no median carina. Scutellar apex slightly depressed. Tegmen lightly sclerotized; apical and preapical cells not depressed; basicostal depression very shallow. Further characters as in the original description for ♂. Body length 6.2–6.4 mm, tegmen 5.2.

MATERIAL EXAMINED: LUZON: 1 ♀ (USNM), Imugin (=Imugan), Nueva Vizcaya Prov., originally a syntype, but bearing no original name label, here designated as lecto-allotype. This very specimen was assumed by Baker (*l. c.*) to be a "juvenile and pale colored male." The only other syntype in the U. S. National Museum is, a ♂ from Baguio, Benguet Subprov., and bears a red name label. It is here fixed as the lecto-holotype. MINDANAO: 1♀ (MCZ), Liro Lake, 2200 m, Mt. Apo, 19. IX, C. F. Clagg.

Pectinariophyes basicostalis Maa, n. sp. Figs. 6 G–H, 11 K–N, 25F.

Male: Testaceous; crown and ante-callus area of pronotum slightly darker; face with a black band across upper portion of postclypeus and extending to upper corner of pleurostome. Tegmen brownish, basal 1/3 brownish black, darkest at basicostal triangle. Spines on hind tibia and tarsus apically black.

Postclypeus evenly convex, shining, lacking distinct lateral transverse lines; pleurostome and lorum shallowly, confluently punctate, anteclypeus not keeled. Crown anteriorly rather broadly rounded, medially with a faint carina; tylus feebly flattened, shallowly striated, anteriorly with a poorly defined arcuate carina; supra-antennal triangle well defined; side piece of vertex scarcely depressed, irregularly wrinkled; occipital margin weakly reflexed near middle; ocellar area little shorter than broad; ocellus equidistant to tylus and occipital margin. Pronotum shallowly, coarsely, rather evenly punctate-reticulate; ante-callus area finely, irregularly wrinkled, with short median carina. Scutellum more finely sculptured than pronotum and with indication of some short coarse wrinkles; discal area hardly depressed; apical area weakly foveate. Tegmen short, broad, with slightly deeper and coarser punctures all-over than those on pronotum; basicostal triangle broad, deeply depressed; R branched beyond middle of tegmen; M subparallel to R_1; apical cells 1 and 2 each longer than broad and much smaller than 3; preapical cell 2 basally open; 1 claval vein, unbranched; corial appendix only about 1/3 length and 1/6 area of claval appendix. Major lateral spine situated beyond midpoint of hind tibia; segment 1 of hind tarsus hard-

ly longer than 3; outer and inner apical lobes of segment 2 subequal in length. Body length 4.9 mm; tegmen 3.9 mm long, 1.8 broad.

MINDANAO: Holotype ♂ (BISHOP 3213), Agusan, Los Arcos, 300 m, N. Mindanao, 20. XI. 1959, L. W. Quate; paratypes 2♂♂ (BISHOP), same data.

In superficial appearance, *basicostalis* is more like a *Hindola* rather than typical *Pectinariophyes* species. It differs from its congeners in having a short and broad tegmen, shallow pronotal and tegminal sculpture, simple tegminal venation and characteristic color markings on face and tegmen. The remnant corial appendix indicates its affinities to *notanda* and *luzonensis*, but the shape and venation of the tegmen are distinctive. The left-side hind tibia of the holotype has only 1 lateral spine, the minor one near base is represented by a poorly defined tubercle.

Pectinariophyes rudinotum Maa, n. sp. Figs. 6 I–J, 11 O–R.

Male: Yellowish green; face darker, postclypeus with brownish transverse lines at each side; crown and ante-callus area of pronotum ochraceous; scutellum yellowish, with irregular brownish markings; venter of thorax yellowish, slightly tinted with greenish, with a very large black marking at center; tegmen pale yellowish, basally little darker; legs brown, hind femur and spines on hind tibia and tarsus black.

Postclypeus gently, evenly convex, minutely punctate, its lateral transverse lines hardly wrinkled; pleurostome and lorum confluently punctate; anteclypeus broadly keeled at anterior 1/2. Crown short, confluently, rather coarsely and deeply punctate all-over, anteriorly separated from face by a well-defined, complete, arcuate carina; tylus only about 1/4 as long as broad, transversely depressed; side piece of vertex deeply depressed, leaving occipital margin exceedingly strongly reflexed; ocellar area more elevated than tylus, 1/2 as long as interocellar distance, laterally gently descending; ocellus much closer to tylus than to occipital margin. Pronotum deeply reticulate, lacking any roundish punctures, meshes of reticulation quite fine, not sharply rimmed, much broader than long at anterior portion (including ante-callus area), gradually becoming coarser and nearly as long as broad on approaching posterior pronotal margin. Scutellum broadly, gently depressed and coarsely punctate-rugose at disc; apical area little flattened. Tegmen short, broad, coarsely, shallowly punctate throughout; basicostal triangle broad, shallowly depressed; vein R branched beyond middle of tegmen; M subparallel to R_1; apical cells 1 and 2 each longer than broad and much smaller than 3; preapical cell 2 basally open; clavus with 2 longitudinal veins (the 2nd poorly defined) and 1 crossvein; corial and claval appendices subequal in length and size. Hind tibia with major lateral spine lying just at midpoint; segment 1 of hind tarsus little shorter than 3; basal lobe of segment 2 little longer than apical lobe. Body length 5 mm; tegmen 4.1 mm long, 1.7 broad.

BORNEO: Holotype ♂ (BISHOP 3217), Tenompok, 1300 m, Mt. Kinabalu, N. Borneo, 13. II. 1959, Maa.

This species has no close affinities with any other known members of the genus and can be immediately distinguished from them in having unusually short head and strongly reticulate pronotum. It bears close superficial similarity to *Hindola viridicans* (Stål) which occurs in the neighboring lowland areas but besides the generic characters, it differs from *viridicans* in having a large conspicuous black mark on the venter and strong sculpture on dorsum.

Pectinariophyes hyalinipennis (Stål), n. comb. Figs. 3 I, 11 S–U, 25G.

Ptyelus hyalinipennis Stål 1855: 96.
Carystus hyalinopterus, Stål 1866: 82 (redescr.) (nom. emend.).
Hindola hyalipennis (sic), Lallemand 1912: 73 (list).
Hindola fasciata Lall. 1955: 406, figs. 1–3. Transvaal: Rustenburg (TVR). **New Synonymy.**

Female: Postclypeus strongly convex, lacking keel, but with very coarse shallow punctures and with about 10 broad shallow transverse impressed lines at each side; upper 1/2 of anteclypeus with medium-sized punctures, lower 1/2 transversely wrinkled and with a distinct keel. Gena and lorum with dense medium-sized punctures and indistinct longitudinal striae; relative breadths of pleurostome and lorum and length of gena proper about 5 : 3.5 : 5. Side piece of vertex coarsely, deeply, irregularly rugose; supra-antennal triangle about 4× as broad as long, depressed, posteriorly bordered by a sharp, high, transverse carina; tentorial pit roundish, very deep; occipital margin strongly sinuate and reflexed near middle; tylus flattened, densely punctate, with indistinct median carina; ocellar area slightly elevated along median line, its lateral margins suture-like, convergent forward. Pronotum coarsely, deeply punctate, punctural interspaces mostly subequal to punctural diameter, punctures on anterior portion slightly finer; median carina absent; ante-callus area rather well defined. Scutellum very weakly depressed at disc; anterior 3/4 coarsely, transversely rugose-punctate, other 1/4 finely transversely wrinkled, lacking any distinct punctures. Tegmen coarsely punctate throughout; clavus with 2 distinct and complete longitudinal and 1 short crossveins. Relative lengths and breadths of head, pronotum and scutellum 11 : 33 : 35 and 42.5 : 45 : 22 respectively. Length of body 8–9 mm, tegmen 6.5–7.0.

Male: Similar. Darker. Postclypeus with short keel near top. Body length 5.5–6.3 mm.

MATERIAL EXAMINED. NATAL: Holotype ♀ (STK), Caffraria, I. Vahlb.; 1 ♂ (TVR), Umtentweni, VII. 1955, A. L. Capener; 4 ♂♂, 4 ♀♀ (TCM), same data, but VII. 1951 and VII. 1954; 3 ♂♂, 2 ♀♀ (TCM), Umtentweni River, VII. 1951, Capener; 2 ♀♀ (TCM), Sea Park, VII. 1950, Capener. TRANSVAAL: 1 ♀ (PTR), Wylie's Poort, 7. II. 1941, Capener; 4 ♂♂, 1 ♀ (TVR), Letaba Valley, Tzaneen Dist., 10–31. XII. 1958, at light, Capener; 2♂♂, 1♀ (PTR), Marieps Mt. (=Mariepskop), highest point in the NE Transvaal Drakensberg or Wolkberg, I. 1926, G. van Son; 1 ♂ (PTR), same but 24–25. I. 1956, L. Vari; 1 ♂, 1 ♀ (PTR), Barberton, E. Transvaal, nr. N. border of Swaziland, I. 1911, A. J. T. Janse. S. RHODESIA: 1 ♂ (TCM), Melsetter, XII. 1946, G. Piper (det. V. Lallemand).

The tegmen of this species, particularly in the ♂, is very variable in color. In one of the 3 ♂♂ from Marieps Mt., it is nearly of the same color as in the typical ♀, the veins are not darker than ground color, the apical fascia is represented by a small, hardly discernible, pale brownish spot, and the brownish granules on veins are correspondingly pale. In the 2nd ♂ of the same lot, the veins are slightly but distinctly darker than ground color and the apical fascia fairly large and distinct. In the 3rd ♂, the tegmen is virtually uniformly brown and its granules and apical fascia are entirely obscured. On the other hand, the 8 ♂♂ and 6 ♀♀, except one seemingly not fully matured ♂, all have distinct blackish brown tegminal fasciae and are referable to *fasciata* Lall. The single ♀ from Letaba Valley is a typical *hyalinipennis*, whereas the 4 ♂♂ of the same series are intermediate of these two forms. As no definite structural characters, including the ♂

genitalia, can be used to differentiate these forms, and their distributional ranges overlap one another, it appears justifiable to suppress *fasciata* as a synonym.

Genus **Aecalus** Maa, n. gen.

Orthotype: *Aecalus pembertoni* n. sp.

Allied to *Hindola*. Body of medium size, slender. Postclypeus (♀) evenly convex. Crown long, protruding forwards, flattened, microsculptured; supra-antennal triangle poorly defined, much shorter than ocellar area, hardly visible in vertical view of crown; tylus nearly as broad as eye. Pronotum long, transversely striate, its anterior margin strongly curved forwards at middle. Scutellum slightly convex. Tegmen hyaline, rather short, punctate throughout (apical cells discally smooth); veins indistinct, R branched beyond middle of costal margin, M slightly curved towards Rs near middle; preapical cell 2 basally open; apical cells concave, short; basicostal triangle broad, weakly depressed; corial appendix reaching 1/2 of apical corial margin; clavus with 2 longitudinal and 1 crossveins. Male unknown.

RANGE: Wallacea and Ceylonese subregions, lowland; 2 species.

The head and pronotum of this new genus are very characteristic and much longer than in any of its allies. *Aikalos* (masc. gender), a flatterer, is given here in allusion of the unusual shape of the head. The above description is based upon the type species. The inclusion of *lucida* Dist. will necessitate slight modification, namely, the crown may be depressed; the supra-antennal triangle, well defined and well visible in vertical view of crown; the pronotum, densely punctate; its width, slightly less than total length of head and pronotum; the discoidal cell of tegmen, evenly punctate and the claval veins, merging together at middle directly, not through a crossvein. The discovery of the ♂♂ may prove that these 2 species are not congeneric.

Aecalus pembertoni Maa, n. sp. Figs. 3J, 6 K–L, 25H.

Female: Ochraceous (? greenish in life), palest at ante-callus area and thoracic and abdominal venter, darkest on crown. Tegmen almost colorless, costal margin whitish and not transparent, apical and anal margins narrowly stained with pale brownish. Tibial and tarsal spines of hind leg apically black. Abdominal segment 3 bright red.

Postclypeus moderately convex, shining, smooth, laterally with 9 indistinct punctate transverse lines. Gena finely, longitudinally striate. Relative breadths of pleurostome and lorum and length of gena proper 5 : 3 : 5. Crown shallowly, irregularly microsculptured; its anterior margin weakly carinate; tylus plane; side piece of vertex hardly depressed; tentorial pit triangular, very shallow; ocellar area barely raised, smooth; occipital margin weakly reflexed; ocello-ocular distance 1/2 longer than interocellar distance. Pronotum proper with shallow, sparse, slightly intersecting transverse striae, lacking any distinct punctures; ante-callus area not depressed, irregularly rugose. Scutellum more weakly striate than pronotum, its apex slightly depressed. Tegmen weakly convex, shallowly punctate; apical cells smooth, with few punctures at sides of veins. Relative lengths and breadths of head, pronotum and scutellum 11 : 32 : 38 and 42 : 45 : 21 respectively. Body length 7.5–8.0 mm; tegmen 5.9 mm long, 2.6 broad.

CELEBES: Holotype ♀ (HSPA), Menado, VI–X. 1926, C. E. Pemberton; paratypes 2 ♀♀, same data.

Aecalus lucidus (Distant), n. comb.

Hindola lucida Dist. 1916: 195, fig. 149.

Female: Uniformly ochraceous; thoracic venter slightly paler; apices of hind tibial and tarsal spines black. Tegmen hyaline, thin, pale yellowish; costal margin, apical cells and clavus brownish yellow; veins, except those enclosing apical cells, not darker than ground color.

Maximum length of gena proper slightly more than minimum width of pleurostome. Crown distinctly carinate along anterior margin; tylus depressed, 3× as wide as long, with indistinct longitudinal fine striae; side piece of vertex distinctly depressed, weakly irregularly rugose; tentorial pit transverse, deep; ocellar area nearly 2× as wide as long, smooth, weakly transversely depressed, gently descending laterad, slightly shorter than tylus; supra-antennal triangle posteriorly bordered by distinct carina. Pronotum shallowly punctate-rugose, punctures dominating at posterior part. Scutellum weakly depressed at disc. Tegmen concave and punctate at apical cells of which the 1st 2 each wider than long; discoidal cell evenly punctate. Relative lengths and widths of head, pronotum and scutellum 25 : 52 : 60 and 77 : 80 : 37 respectively. Body 7 mm long.

MATERIAL EXAMINED: S. INDIA: Holotype ♀ (BMNH), Parambikulum, Cochin State.

Genus **Chaetophyes** E. Schmidt

Chaetophyes E. Schmt. 1919: 367. Orthotype: *Ch. bicolor* E. Schmt. (syn. of *Aphrophora compacta* Wk.).

Body of small to medium size, rather robust to fairly slender, distinctly broader than deep in profile. Head slightly narrower than pronotum. Ante- and postclypeus evenly convex in ♀; postclypeus usually weakly keeled in ♂. Pleurostome broader than lorum, separated from lorum by a long deep suture; maximum length of gena proper and minimum breadth of pleurostome subequal; maxillary plate slightly exposed. Eye shorter than broad, its inner margin weakly curved and distinctly angulate at lower end; outer margin not touching hind margin of head. Crown weakly depressed, irregularly rugose, rarely smooth; its anterior margin in ♂ broadly rounded, in ♀ subangulate or strongly produced at middle; tylus usually much narrower than eye and hardly broader than side piece of vertex; supra-antennal triangle well defined, well visible in vertical view of crown; ocelli much closer to each other than to eyes. Pronotum coarsely rugose, usually with some intermingling punctures; anterolateral margin carinated and weakly reflexed. Scutellum very low, flat or nearly flat. Tegmen short, broad, transparent, apically or entirely smooth, basally more or less punctate; basicostal area broad, distinctly depressed; disc of corium convex; apical and preapical cells distinctly concave; veins prominent, deeply pigmented; venation rather similar to that in typical *Hindola*, but R branched far beyond middle of costal margin, apical cells short but large, rm_1 shorter, apical abscissae of Rs and M not strongly switched toward anal margin; corial appendix usually reaching 1/2 of apical corial margin, rarely vestigial. Hind tibia with 1–2 lateral spines, when 2, then the major one about 2/5 as long as breadth of tibial apex; inner and outer apical lobes of hind tarsomeres

subequal in length. Female anal segment partly concealed, ovipositor-sheath nearly vertical.

RANGE: Australian, Papuan and Wallacea subregions, lowland to submontane; 7 species.

This fairly weak genus of the *Hindola* subgroup is here recognized as distinct merely on the ground of its exposed supra-antennal triangle, uneven tegminal surface, subdivided anal segment and rather strong sexual dimorphism. Baker (1927: 532 & 543) gave a long list of presumably distinctive characters, but it appears to have been based on one single species, *Chaetophyes compacta* Wk. With the inclusion of the other 6 species in this genus and the discovery of transitional forms in *Hindola*, most of the characters listed are no longer useful for separating *Chaetophyes* and *Hindola*.

Members of the genus fall into 3 groups: *lubricans*-group, 1 species, Papuan subregion; *kukukukui*-group, 3 species, Papuan and Wallacea; and *compacta*-group, 3 species, Australian. Characters of the groups are given in the key but not repeated elsewhere.

KEY TO SPECIES OF CHAETOPHYES

1. Corial appendix of tegmen vestigial, much smaller than claval appendix, only as broad as ambient vein; tylus as broad as eye, much broader than side piece of vertex; ocello-ocular distance 1/2 longer than interocellar distance; hind tibia with 2 lateral spines (except in *ceramensis*); postclypeus almost evenly convex; crown short, irregularly rugose, both not showing distinct sexual dimorphism; supra-antennal triangle much shorter than ocellar area; tegmen extensively smooth, with coarse dense punctures only along basal 2/3 of costal margin, at both sides of vein Cu and at clavus; discoidal cell finely and quite sparsely punctate (*kukukukui*-group) 2

   Corial appendix well developed, much larger than claval appendix, reaching 1/2 of apical corial margin; tylus much narrower than eye; ocello-ocular distance 2× interocellar distance 4

2 (1). Ocellar area much shorter than tylus; ocellus equidistant to tylus and occipital margin; tegmen lacking sub-basal colorless fascia, basally blackish brown, gradually becoming paler toward apex where it is brownish; crown, pronotum and scutellum uniformly yellow (anterior margin of tylus brown); crown anteriorly broadly rounded ..... **ceramensis**

   Ocellar area slightly longer than tylus; ocellus closer to occipital margin than to tylus; tegmen with broad sub-basal colorless fascia, basal and middle parts brown, apical 2/5 colorless (apical margin brownish); crown, pronotum and scutellum ochraceous or olive green, with pale stripe along lateral margin of pronotum 3

3 (2). Head subangularly produced forward; pronotum broadly white along lateral margin, with sparse rugae and many punctures at disc; postclypeus (♀) largely brown ..... **bloetei**

   Head anteriorly broadly rounded; pronotum narrowly yellow along lateral margin, with dense rugae and few or no punctures at disc; postclypeus entirely (♂) or predominantly (♀) black ..... **kukukukui**

4 (1). Crown smooth, very shining; hind tibia with only 1 lateral spine; tegmen smooth throughout, with only few fine indistinct punctures narrowly along M+Cu and claval veins and along base portion of costal margin; postclypeus (♂) with

a short keel near top (♀ unknown); supra-antennal triangle much shorter than ocellar area; ocellus closer to tylus than to occipital margin; pronotum 30/41 as long as broad (*lubricans*-group)..... **lubricans**

Crown irregularly rugose, at most slightly shining; hind tibia with 2 lateral spines; tegmen strongly punctate at clavus and at basal 2/3 of corium; postclypeus evenly convex in ♀, weakly keeled in ♂; supra-antennal triangle as long as or longer than ocellar area; ocellus equidistant to tylus and occipital margin; pronotum proportionally short (*compacta*-group) 5

5 (4). Basal 2/5 of anal margin of tegmen almost always broadly yellowish greenish and not transparent, in contrast with basal portion of corium; postclypeus yellow, unicolored, lacking distinct transverse rugae at side; crown finely striate; tylus in ♀ strongly produced forward and hence significantly different from that of ♂; median length of head and pronotum together in ♀ equal to breadth of pronotum; pronotum and scutellum in ♂ yellowish green, never dark brown or black; body length ♂ 4.5–5.0 mm, ♀ 6.0–7.2..... **vicina**

Basal portion of tegmen including anal margin unicolored, brown to black; postclypeus entirely black or with dark markings, with very distinct transverse rugae at side; crown rather roughly rugose; tylus of ♀ never strongly produced forward and markedly different from that of ♂; median length of head and pronotum together in ♀ distinctly smaller than breadth of pronotum; pronotum and scutellum in matured ♂ dark brown to black, never yellowish green; body length ♂ 5.5–5.8 mm, ♀ 7.1–8.2..... 6

6 (5). Body rather slender; its length to tegminal apices about 2.7–2.8× breadth of pronotum; pronotum about as broad as tegmen; tegmen more than 2× as long as broad; mature ♂ dark reddish brown and with tegmen black at basal and apical fasciae and along veins of discal area (pale at remaining area); mature ♀ yellowish green, tegmen brown and with a complete or nearly complete, broad pale fascia ..... **admittens**

Body proportionally robust and compact, its length to tegminal apices only about 2.3–2.4× breadth of pronotum; pronotum distinctly narrower than tegmen; tegmen slightly less than 2× as long as broad; mature ♂ uniformly shining black, tegmen usually concolorous with body, seldom slightly paler and with irregular pale markings at discal and apical areas; mature ♀ yellowish green (changed to ochraceous in old specimens), tegmen dark brown to black, often with 1 or 2 pale spots near middle but never with broad pale fascia..... **compacta**

Chaetophyes lubricans Maa, n. sp. Figs. 6 M–N, 13 A–D, 25 I.

Male: Brown, darkest on face, lateral area of pronotum and apical portion of hind leg; venter of body and lateral surface of thorax uniformly yellowish. Postclypeus with a large triangular yellowish mark; crown yellowish, its anterior margin black; ocellar area brown. Pronotum brownish yellow, median line slightly paler, lateral margin broadly yellowish, posterolateral corner slightly darkened. Scutellum broadly yellowish along median line, black at extreme apex. Tegmen hyaline, basal 1/4 and costal margin dark brown; veins brown, basal 1/3 of M and of Cu and middle 1/3 of claval vein colorless; apical and preapical cells yellowish. Legs yellow, tibiae and tarsi tinted with brown, their spines apically black. Abdominal tergites 2 and 3 yellow,

Head smooth, lacking distinct sculpture; postclypeus laterally with 7 rather strong rugae; anterior margin of crown raised, weakly carinate; occipital margin strongly reflexed; tylus weakly concave; side piece of vertex depressed near ocellus; tentorial pit small, very shallow; ocellar area transversely depressed. Pronotum strongly convex, with coarse, fairly shallow rugae; ante-callus area depressed, with fine, quite dense, concentric wrinkles; area outside of yellow lateral stripe longitudinally wrinkled; anterior margin scarcely raised; posterior margin subangularly sinuate at middle. Scutellum gently convex, feebly wrinkled, discally slightly flattened, apically smooth and weakly concave; extreme apex slightly upraised. Relative lengths and breadths of head, pronotum and scutellum 8 : 30 : 28 and 40 : 41 : 18 respectively. Body length 6.5 mm; tegmen 5.6 mm long, 2.6 broad.

W. NEW GUINEA: Holotype ♂ (BISHOP 3214), Waris, 450–500 m, Hollandia Residency, 1–18. VIII. 1959, Maa.

As indicated by the name (*lubricans*, smooth, shining) and described in the key, this new species can be readily distinguished by the smooth head and tegmen. The pale dorsal markings of body and the single lateral spine of hind tibia are also unusual.

Chaetophyes ceramensis Lallemand

Chaetophyes ceramensis Lall. 1927: 99.

Male: Dark marking on venter of head and of thorax as in *bloetei* but that on head noticeably darker, almost pitchy black (gena proper slightly paler than pleurostome) and mesosternum entirely pale except at lateral area. Color of tegmen as described in key to species.

Postclypeus slightly flattened at disc. Crown short; tylus slightly wider than an eye, about 3.5× as wide as long, its anterior and posterior margins subparallel; ocellar area slightly longer than tylus, with faint median carina; ocellus closer to occipital margin than to tylus; side piece of vertex depressed (not so in *bloetei*). Pronotum comparatively short and broad (55×72), with slightly weaker sculpture than in *bloetei*. Scutellum weakly depressed discally and preapically. Relative widths of head and pronotum 67 : 72. Hind tibia apparently with only 1 lateral spine. Other characters similar to that in *bloetei* (Genitalia not examined). Body length 6.5 mm.

MATERIAL EXAMINED: CERAM: Holotype ♂ (BMNH), Ceram, with no further details.

Chaetophyes kukukukui Maa, n. sp. Figs. 4A, 6 O–P, 13 E–H, 25J.

Male: Olive green in fresh specimens, ochraceous in old ones. Postclypeus, gena and lorum black. Crown brown. Tegmen hyaline; basal 1/4 and mid fascia of corium and entire clavus brown; apical margin brownish; anal margin narrowly whitish; veins brown, those between basal and middle brown fasciae colorless. Femora brown; tibia and tarsi darker; tibial spines of hind leg apically black. Abdominal tergites largely black.

Postclypeus evenly convex, finely punctate, with 6 faint rugae at each side. Anteclypeus strongly convex. Crown moderately long, rugose, anteriorly weakly carinate, posteriorly reflexed; tentorial pit broad, shallow; tylus plane; ocellus equidistant to tylus and occipital margin; ocellar area a little flattened discally. Pronotum densely rugulose and scarcely punctate at disc; humeral and ante-callus areas irregularly rugose. Scutellum gently convex, weakly wrinkled; its apex depressed. Relative lengths and breadths of head, pronotum

and scutellum 8 : 24 : 29 and 35 : 37 : 17 respectively. Body length 6 mm; tegmen 5.0–5.3 mm long, 2.2–2.3 broad.

Female: Similar. Crown and ante-callus area both stramineous. Tegmen and legs darker. Relative lengths and breadths of head, pronotum and scutellum 7.5 : 25 : 28 and 36 : 37 : 17 respectively. Length same as in ♂.

NE NEW GUINEA: Holotype ♂ (BISHOP 3215), Mt. Otto, 2200 m, E. Highlands, 22. VI. 1955, Gressitt; allotype ♀ and paratype ♀ (BISHOP), Daulo Pass, 3000 m, Asaro-Chimbu div., E. Highlands, 13. VI. 1955, Gressitt.

Kukukuku is the name of a head hunting tribe living not far from the type locality.

Chaetophyes bloetei Maa, n. sp. Figs. 6 Q–R, 25K.

Female: Ochraceous. Venter with a broad brownish black curved band which crosses postclypeus, covers entire gena and thence becomes brown and extends to discal tubercle on lateral surface of metathorax. Lorum and lower portion of postclypeus brown. Pronotum with a broad ivory white stripe running near anterolateral margin and along posterolateral margin; anterolateral margin narrowly brown. Tegmen hyaline, brown at basal 1/3 and mid corial fascia; veins between these 2 fasciae colorless, those beyond mid fascia brown and gradually becoming paler on approaching apical margin; apical margin rather broadly stained with light brownish; anal margin narrowly ivory white. Venter and lateral side of mesothorax largely ivory white. Fore and mid tarsi and entire hind leg brownish black. Abdominal tergites 2 and 3 largely ivory white, 4 largely black.

Face and pronotum more weakly convex than in *Ch. kukukukui*. Crown anteriorly subangularly produced; tentorial pit very large. Pronotum proportionally longer than in *kukukukui*, with rather evenly interspaced rugae and some distinct intermingling punctures. Scutellum distinctly wrinkled. Relative lengths and breadths of head, pronotum and scutellum 10.5 : 29 : 31 and 40 : 40 : 18 respectively. Other characters similar to *kukukukui*. Body length 6.6 mm; tegmen 5.5.

W. NEW GUINEA: Holotype ♀ (LDN), Neth. Ind.-American New Guinea Exped., *Araucaria* Camp, 800 m, 29. III. 1939, L. J. Toxopeus; paratype ♀ (BISHOP), same Exped., Bernard Camp, 50 m, VIII. 1938, J. Olthof.

The holo- and paratypes have been determined and recorded as *Ch. ceramensis* Lall. by Dr. H. C. Blöte (1957, Nova Guinea n. ser. **8**: 10). Upon my request, Dr. W. E. China kindly compared the Bernard Camp specimen with the type of *ceramensis* and noted that the former differs markedly from the latter in the much more acute apical margin of the frons and in the different color pattern.

Ch. bloetei stands very close to *Ch. kukukukui* both in color and structure and possibly is a subspecies of the latter. Its distinctive characters are the larger body size, acuter head (both in dorsal and lateral aspects), longer pronotum, more conspicuous pale thoracic markings and stronger scutellar sculpture.

Chaetophyes admittens (Walker), n. comb. Figs. 4B, 12, 25L, 29B.

Aphrophora admittens Wk. 1858: 345, ♂.

Very similar to next species, *Ch. compacta* Wk., length similar, but differing in follow-

ing points: Body much slenderer; breadth and profile depth distinctly smaller; ♂ tegmen with dark markings distinctly darker than body (in *compacta* ♂, tegmen as dark as or paler than body); ♀ body and tegmen never black. Transverse carina (♂) separating tylus from postclypeus stronger. Pronotum less convex. Tegminal surface rather even; apical and preapical cells weakly concave, in ♀ with indistinct shallow wrinkles. Relative lengths and breadths of head, pronotum and scutellum ♂ 9 : 27 : 26 and 35 : 37 : 15, ♀ 11 : 32 : 34 and 43 : 45 : 19 respectively. Other characters as given in the key. Body length ♂ 5.5–6.0 mm, ♀ 6.7–8.2.

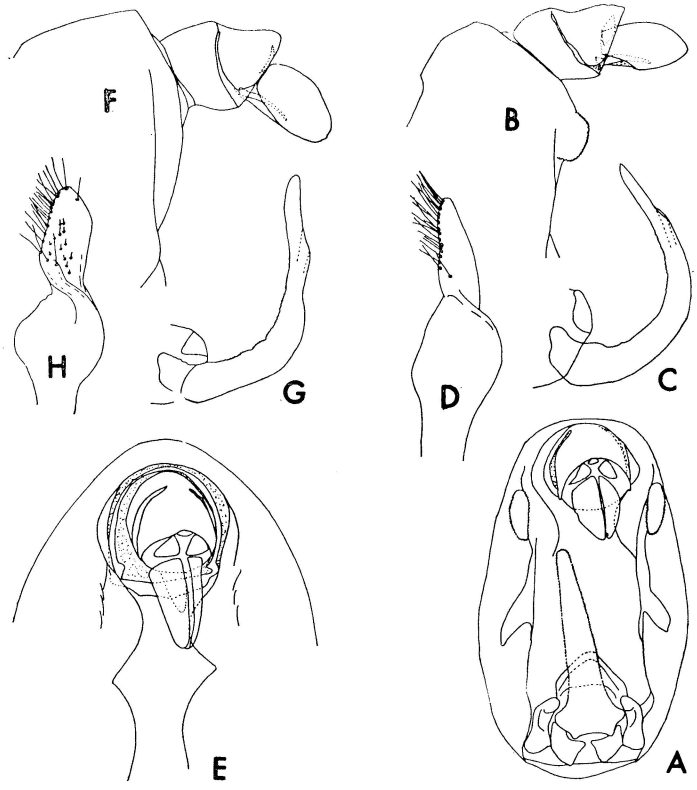

Fig. 12. *Chaetophyes admittens* Wk., normal ♂ (A–D) and transitory intersex (E–H), genitalia, hind view (A, E); same, upper part, side view (B, F); aedeagus and perandrium, side view (C, G); paramere (D, H). All drawn to same scale. (For ♂ genitalia of other *Chaetophyes* spp., see Fig. 13.)

MATERIAL EXAMINED: QUEENSLAND: 1 ♂ (CJD), Gondiwindi, 2. XI. 1934, A. J. Turner; 1 ♂ (CJD), Burleigh, 1. XII. 1926, L. Franzen. N. S. WALES: Holotype ♂ (BMNH ex Ent. Club #44/12), New Holl., no further details; 18 ♂♂, 9 ♀♀ (CSIRO), Including 1 ♀ selected as neallotype and 1 ♂ compared by W. E. China with type, Black Mt., *ca.* 600 m, nr. Canberra, at mercury vapor light trap, 29. XI. 1960–13. I. 1961, L. F. B. Common; 1 ♂ (AM), Hornsby, C. Gibbons; 1♂ (AM), Collubri, Nyngan, II. 1933, J. Armstrong; 3 ♂♂ (BISHOP), X. 1902 and X. 1903, R. Helms; 1 ♀ (BISHOP), Albion Park,

Helms. VICTORIA: 1 ♂, 4 ♀♀ (NMV), Kiata, X. 1928, F. E. Wilson. TASMANIA: 4 ♀♀ (SAM), "Tasmania #2714", A. Simson.

This species was first suppressed by Stål (1862: 494) as a synonym of *australiae* Wk. Since then this was followed by Kirkaldy (1906: 387), Lallemand (1912: 72) and Metcalf (1960: 8). As in *compacta*, it varies in color and size and shows strong sexual dimorphism, and in both sexes, it differs very little from the former species. Before receiving the beautiful series of fresh specimens collected at Black Mt., I was rather in doubt about the correctness of the sex-association. It may be worthwhile to note that the Black Mt. material contains not a single specimen of *compacta*, whereas the Canberra material is entirely *compacta*, notwithstanding these two places are close to each other and at nearly the same altitude, and the specimens were collected in the same season. The Black Mt. vegetation is, however, quite different from that of the plain (Dr. K. H. L. Key, *in litt.*). It thus appears rather likely that *admittens* is more specific to its environmental requirements and consequently less extensive in distribution than *compacta*.

Chaetophyes compacta (Walker) Figs. 4C, 13 I–L, 25M.

Aphrophora compacta Wk. 1851: 701, ♀. Type, Van Dieman's Land.
Aph. bifrons Wk. 1851: 702. Type, New Holland.
Lepyronia (?) *australiae* Wk. 1851: 727. Type, New Holland.
Aphrophora semiflava Wk. 1858: 187. Type, "New Hebrides ?."
Aphrophora (?) *areolata* Wk. 1858: 345. Type, Tasmania.
Carystus mutabilis Spångberg 1877: 13, ♂♀. Type, Australia borealis et occidentalis. **New Synonymy.**
Hindola compacta (=*semiflava*)+ *H. australiae* (=*areolata*)+ *H. mutabilis* + "*Aphrophora*" *bifrons*, Kirkaldy 1906: 387 (list).
Hindola bifrons+*H. australiae*+*H. compacta*, Lallemand 1912: 72 (list).
Hindola mutabilis, Lall. 1912: 73 (list).
Chaetophyes bicolor E. Schmidt 1919: 368, ♀. Type, Australia (no further details) (WSW). —Baker 1927: 544, pl. 3 (32–35) (notes). **New Synonymy.**
Chaetophyes unicolor E. Schmt. 1919: 369, ♂. Type, Australia (no further details) (WSW).
Polychaetophyes serpulidia, Hacker 1922: 281, pls. 17 (4) & 18 (5–8) (bion.) (misidentification).
Polychaetophyes perkinsi Hack. 1926: 246, pl. 42 (6), ♀. Type, Queensland: Stanthorpe.
Hindola australiae (p. 8)+*H. bifrons* (p. 9)+*H. mutabilis*+*H. mutabilis* var. (p. 12)+*Chaetophyes bicolor* (p. 18)+*Ch. compacta* (p. 19), Metcalf 1960: 8, 9, 12, 18, 19.

Body robust and compact, color pattern of ♂ much darker than in ♀. Head in ♀ not distinctly produced forward. Postclypeus at each side with deep impressed transverse lines interspaced by haired rugae; medially often with a short weak keel. Side piece of vertex roughly rugose, in ♀ slightly depressed. Tylus also slightly depressed, finely longitudinally striate; in ♂ separated from postclypeus by a weak transverse carina; in ♀ less than 1/2 as long as broad, anteriorly rounded-off. Ocellar area long, about 2/3 as long as interocellar distance, in ♂ often longitudinally raised. Occipital margin strongly reflexed; tentorial pit roundish, small, very shallow. Supra-antennal triangle not longer than ocellar area. Pronotum with coarse, undulating and intersecting rugae, lacking distinct roundish punctures. Scutellum with straight, non-intersecting rugae. Tegminal surface

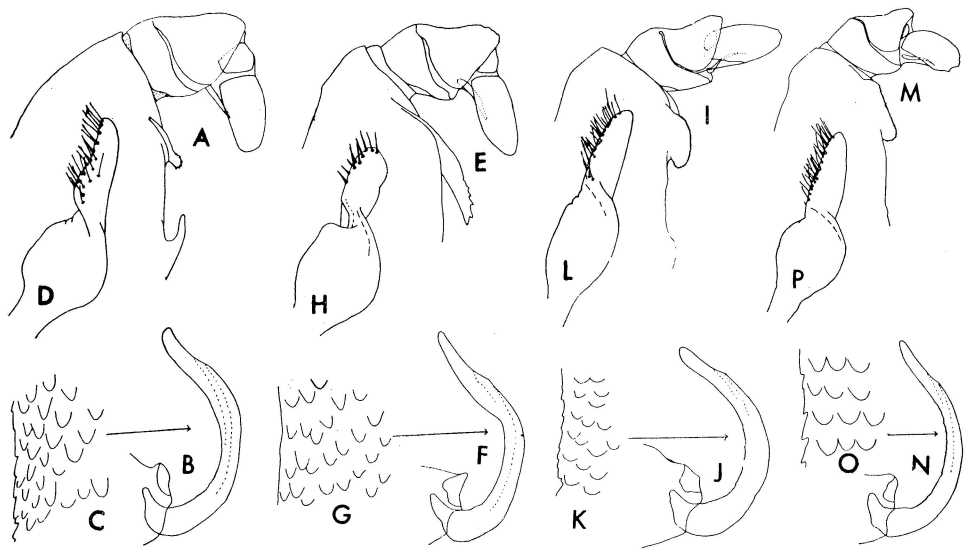

Fig. 13. *Chaetophyes* spp., ♂ genitalia, upper part, side view (A, E, I, M); aedeagus and periandrium, side view (B, F, J, N); aedeagal scales (C, G, K, O); paramere, side view (D, H, L, P). A–D, *lubricans* Maa, holotype; E–H, *kukukukui* Maa, holotype; I–L, *compacta* Wk.; M–P, *vicina* Lall. All except aedeagal scales in same magnification (For ♂ genitalia of *Ch. admittens*, see fig. 12).

strongly uneven, apical and preapical cells distinctly concave and smooth in both sexes. Relative lengths and breadths of head, pronotum and scutellum ♂ 9 : 27 : 25 and 36 : 38 : 16, ♀ 13 : 35 : 31 and 44 : 50 : 22 respectively. Body length ♂ 5.5–5.8 mm, ♀ 7.1–8.2.

Male usually almost entirely shining black, with 1 or 2 pale spots at preapical cells of tegmen; (in 1 example from Hobart, tegmen dark brown at basal 1/3 and apical margin, with irregular brown markings at middle). Female body greenish yellow, tegmen varying from uniformly brownish to uniformly black, very often with some pale irregular markings, but no distinct pale fascia.

MATERIAL EXAMINED: QUEENSLAND: 2♀♀ (CJD), Sandgate, 18. XII. 1926, H. Hacker (det. Hacker as *Polychaetophyes serpulidia* Kirk.); 2♂♂, 2♀♀ (CJD), Stanthorpe, 2. I. 1930, E. Sutton; 1 ♀ (CJD), Stanthorpe, XI. 1924, F. A. Perkins, paratype of *Polych. perkinsi* Hack.; 2♂♂, 1 ♀ (STK), Australia boreal., G. Thorey, paratypes of *Carystus mutabilis* Spgbg.; 2♂♂, 1 ♀ (CSIRO), 1.6 km NNW Dalveen, 25. X. 1956, P. B. Carne; 1 ♀ (SAM), Brisbane, X. 1920, F. E. Wilson. N. S. WALES: 1 ♂ (BMNH, holotype of *australiae*), New Holland; 1 ♀ (BMNH), N. Holland, "Ent. Club. 44–12." 1 ♂, 2♀♀ (AM), Tubraducca, Upper Hunter Dist., 1300 m, I. 1948, A. Musgrave *et al.*; 2♂♂, 2♀♀ (AM), Colong Dist., nr. Yerranderrie, XI. 1927, Musgrave & T. G. Campbell; 1 ♀ (AM), Duggan's Gully, Upper Chichester, IX. 1921, Musgrave; 1 ♀ (AM), Sawpit Ck., 1200 m, Mt. Kosciusko, 8. I. 1929, Musgrave; 2♂♂ (AM), Hasting Range, 9. XI. 1932, K. C. M. KcKeown; 1 ♀ (USNM), Ebor, 1600 m, H. Petersen; 2♂♂, 1 ♀ (USNM), Sydney; 1 ♀ (USNM), Orange; 1 ♂, 1 ♀ (USNM), Beaconsfield; 2♀♀ (CSIRO), 24 km NW Braidwood, 21. XI. 1956. P. B. Carne; 1 ♂ (USNM), Botany Bay, Petersen; 6♂♂, 8♀♀ (CSIRO), Canberra, A. C. T., 23. XI. 1956, Carne; 3♀♀ (CSIRO), Canberra, XI. 1929,

G. Hill; 1 ♀ (CSIRO), Blundell's Farm, nr. Canberra, 27. I. 1930, I. M. Mackerras; 1 ♀ (SAM), Mt. Kosciusko, B. Ingleby; 1 ♀ (SAM), vicinity of Jenolan Caves, J. C. Wiburd; 15 ♂♂, 34 ♀♀ (USNM), Ebor, 1500 m, Petersen. VICTORIA: 1 ♀ (NMV), Sassafras Gap, 1000 m, 30. I. 1957, A. Neboiss; 1 ♀ (STK, holotype of *mutabilis*), Melbourne, J. C. Stevens; 3 ♀♀ (USNM), Oakleigh, 15. X. 1892; 2 ♂♂ (USNM), Warragul; 1 ♂ (CSIRO), Drouin, Gippsland, W. W. Froggatt; 1 ♀ (SAM), Mt. Difficult Rge., Grampians, 650 m, 9. II. 1956, at m. v. l., N. B. Tindale; 1 ♀ (SAM), Bright, H. W. Davey; 2 ♀♀ (SAM), Lorne, 23. X. 1918, Wilson. S. AUSTRALIA: 1 ♀ (SAM), Lucindale, Feuerheerdt coll.; 1 ♂ (SAM), Mt. Lofty Rg., J. G. O. Tepper; 1 ♂ (SAM), "Australia", T. Blackburn; 1 ♀ (SAM), South Para Hills, 21. X. 1888, J. G. O. Tepper; 1 ♀ (SAM), Glen Osmond, 29. XI. 1932, R. V. Southcott. TASMANIA: 1 ♀ (BMNH, holotype of *compacta*), "V. D. Land 48/56"; 1 ♂, 2 ♀♀ (AM), Hobart, 15. XII. 1912, 23. XI. 1913 & 5. XI. 1916, G. H. Hardy; 1 ♀ (CJD), same, but I. 1934; 3 ♀♀ (SAM), Hobart, A. M. Lea; 1 ♀ (BMNH), Hobart, Lea, compared with type of *compacta* by R. J. Izzard; 4 ♀♀ (AM), Lake St. Clair, 13. I. 1937, G. & C. Davis; 1 ♂ (AM), Pieman Bridge, 8. I. 1937, G. & C. Davis; 1 ♂ (USNM), Launcester, 3. XI. 1894; 1 ♀ (CSIRO), 6 km E of Scottsdale, 9. I. 1949, E. F. Riek; 1 ♀ (CSIRO), 5 km E of Storey's Creek, 18. I. 1948, Carne; 1 ♀ (SAM), George Town, 17. XI. 1914; 1 ♀ (SAM), West Tamar, 21. XII. 1902; 1 ♀ (SAM), St. Marys, #2287.

OTHER SPECIMENS: 1 ♀ (STK), Nova Hollandia, H. J. Ekelberg; 1 ♂, 6 ♀♀ (USNM), ex F. W. Goding coll., no locality labels; 2 ♀♀ (USNM), Mordralloe; 2 ♀♀ (USNM), B1 & M1 Mts.

HOST PLANTS: *Eucalyptus* spp. (Mrytaceae).

This is probably the commonest species of the family and is found practically everywhere in Australia as far as its host plants grow. By convenience, it can be separated from the 2 closely related but much rarer Australian species, *admittens* Wk. and *vicina* Lall. in having a larger and heavier body. The color varies particularly in the ♂. Unfortunately the material at my disposal was received and examined at different intervals, and I am not sure whether or not it can be divided into seasonal or geographic races. I must also admit that a few of the ♀ specimens listed above may actually belong to *admittens* Wk. The association of the sexes was definitely established at the last moment when the present paper was nearly completed and nearly all the material borrowed had been returned. It is hoped that some time in the future I can borrow the specimens and check the determinations once again and analyze the seasonal and geographic data.

I did not see types of *unicolor* and *bicolor*. In the F. Walker collection at the British Mus., there remain 2 ♂♂ and 6 ♀♀ of this species. They are:

1 ♂, type of *australiae*, #44/4, "New Holl.?". Pronotum and scutellum black, tegmina with basal (black) and apical (blackish brown) fasciae, intermediate area largely colorless.

1 ♂, type of *areolata*, #46/81, "V. D. L." (=Van Diemens Land, =Tasmania). Color pattern practically identical with type of *australiae*.

1 ♀, type of *compacta*, same data as in type of *areolata*. Color pattern rather pale.

2 ♀♀, #56/85, no name or locality labels, but in the ledger, it was remarked under this number: "No localities on specimens. Presented by Sir John Liddell, M. D. From voyage of H. M. S. Herald (Capt. Denham, R. N.), Solomon Is., New Hebrides, Australia, S. America, N. Zealand." Also, under #55/69, there is a note: "The Herald was at the New Hebrides, Solomon Is., Fiji Is., etc. Collected by Mr. MacGillivray." Apparently these

2 ♀♀ are syntypes of *semiflava* which was originally described from "New Hebrides?".

1 ♀, type of *bifrons*, slightly smaller than type of *compacta*, and its discoidal pale fascia is more conspicuous.

2 ♀♀, #62/10, "Austral.", one bears a printed label "*Aphrophora semiflava*" and another not. They can not be considered syntypes of *semiflava* which was originally described from "New Hebrides?". These 2 ♀♀ are slightly darker than type of *compacta*.

Chaetophyes vicina Lallemand Figs. 4D, 13 M–P, 25N.

Chaetophyes vicina Lall. 1927: 99.

Body greenish yellow; face lacking black markings. Tegmen in ♂ almost uniformly blackish brown, preapical area slightly paler; in ♀ brown, with 1 broad colorless fascia before middle and another less conspicuous one beyond middle; basal 2/5 of anal margin in both sexes broadly greenish yellow, not transparent.

Body slender, color pattern in ♂ slightly darker than in ♀. Head in ♀ distinctly produced forward. Postclypeus smooth and shining, lacking distinct rugae at side and lacking keel. Crown rather smooth, finely striate; side piece of vertex in ♀ distinctly depressed. Tylus sharply marked off from postclypeus, in ♂ distinctly depressed, in ♀ flattened, 1/2 as long as broad, anteriorly with a strong transverse carina. Ocellar area short, 2/5 as long as interocellar distance. Supra-antennal triangle 2× as long as ocellar area. Pronotum less humpbacked than in *compacta*, coarsely rugose-reticulate, with distinct roundish punctures all-over; rugae at posterior 1/2 not predominant over punctures. Surface of tegmen weakly uneven. Relative lengths and breadths of head, pronotum and scutellum ♂ 7 : 21 : 22 and 30 : 31.5 : 14, ♀ 10 : 26 : 29 and 36 : 39 : 17 respectively. Further characters similar to *compacta*. Body length ♂ 4.5–5.0 mm, ♀ 6.0–7.2.

MATERIAL EXAMINED: QUEENSLAND: 1 ♂ (AM), Cairns, J. G. Brooks; 13 ♂♂, 7 ♀♀ (AM), Pentland, VIII–X. 1942, Brooks; 1 ♀ (AM), Cunnamulla, X. 1941, N. Geary. N. S. WALES: 2 ♀♀ (BMNH, incl. Holotype, glued on one same paper-point), Maree; 1 ♂ (BMNH), same locality; 1 ♀ (BISHOP), Bourke, X. 1909, R. Helms; 1 ♀ (BISHOP), "Australia", Helms; 2 ♂♂, 2 ♀♀ (CSIRO), Black Mt., nr. Canberra, at mercury vapor light trap, 11–13. I. 1961, I. F. B. Common. W. AUSTRALIA: 1 ♀ (BMNH) Dedri, 28k m W of Coolgardie, 11–21. I. 1936, R. E. Turner; 1 ♀ (AM), Perth, II. 1960, M. Wallace. S. AUSTRALIA: 1 ♂, 1 ♀ (SAM), Wilpena Pnd., 27. XI. 1951 & 9. II. 1956, at light, G. F. Gross; 1 ♀ (SAM), "Kurige" Blackwood, 300 m, 8. XII. 1955, at light, N. B. Tindale.

Genus **Hindola** Kirkaldy

Hindola Kirk. 1900: 243. Orthotype: *Ptyelus viridicans* Stål. Synonymy as under the subgenus *Hindola*, s. s.

Body of small, seldom medium size, slender, weakly humpbacked, distinctly broader than deep in profile. Head subequal in breadth to pronotum. Anteclypeus almost evenly convex; postclypeus weakly flattened, in ♂ with a crater-like small tubercle near top. Pleurostome broader than lorum, separated from latter by a long deep suture; maximum length of gena proper usually less than minimum breadth of pleurostome; maxillary plate hardly exposed. Eye broader than long, its inner margin weakly curved and distinctly an-

gulate at lower end; outer margin often nearly touching hind margin of head. Crown irregularly rugose, seldom densely micropunctate, well depressed, sharply marked off from face; tylus short, showing no sexual dimorphism, as broad as or broader than side piece of vertex; supra-antennal triangle short, well-defined, usually invisible in vertical view of crown; ocelli closer to each other than to eyes. Pronotum rugose, transversely striate or punctate; anterolateral margin carinate. Scutellum low, discally convex, seldom depressed. Tegmen about 2× as long as broad, transparent, basally punctate; apical cells and often part of preapicals smooth and concave; basicostal triangle broad; veins seldom distinct and darker than ground color; Rs and M apically curved analward; Cu for the most part parallel to and apart from claval furrow; corial appendix reaching about 1/2–2/3 of apical corial margin; clavus with an apically branched longitudinal vein. Hind tibia with 2 lateral spines, the major one about 1/2 as long as breadth of tibial apex. Inner and outer apical lobes of hind tarsomeres subequal in length. Female anal segment well exposed, ovipositor-sheath vertical or nearly vertical.

RANGE: Ceylonese, Malaysian and Indo-Chinese subregions, lowland to submontane; 12 species.

This genus is closely related to *Pectinariophyes* and *Chaetophyes* and is mainly characterized by the short, dorso-ventrally compressed head and the strongly curved Rs and M veins. The ♂ can be immediately recognized by the crater-like tubercle on the postclypeus. The outline of the crown, unlike that of *Chaetophyes*, does not show significant sexual dimorphism. In Baker's (1927: 538) classificatory system, the genus was partly split into a separate genus *Parahindola* and partly confused with *Pectinariophyes*, *Polytrichophyes*, *Taihorina* and *Xenaias*. As here restricted, it is provisionally divided into 2 subgenera.

Besides the 12 species enumerated below, the following 3 have been wrongly described under or once assigned to *Hindola*:

Aphrophora albicincta Erichson 1842 (Arch. Naturgesch. **8** (11): 285). Australia. Now assigned to the genus *Bathyllus* Stål (Cercopidae: Aphrophorinae). The species was briefly redescribed by Hacker (1926: 243).

Lepyronia convexa Walker 1851: 726. Synonym of the preceding species.

Hindola longipennis Lallemand 1924 (Bull. Mus. Paris **1924**: 297). New Caledonia. Type species of the genus *Strandiana* Lall. (Cercopidae: Aphrophorinae). The genus and species will be redescribed and published elsewhere.

KEY TO SUBGENERA AND SPECIES OF HINDOLA

1. Postclypeus horizontal in profile; tylus as broad as eye; scutellum medially carinated; tegmen largely smooth, punctures only found at basicostal triangle and discoidal cell; corial appendix 2/3 as long as apical corial margin; (subgenus *Platycotta*); crown and pronotum yellow, with some broad, black transverse lines; tegminal veins strong, partly yellow and partly black ..... **prostrata**

   Postclypeus more or less oblique in profile; tylus much narrower than eye; scutellum not medially carinated; tegmen extensively punctate at clavus and basal 1/2–2/3 of corium; corial appendix 1/2, rarely 2/3 as long as apical corial margin (subgenus *Hindola*, s. s.); color pattern not as above 2

2(1). Tegmen with a distinct brown apical fascia, corial appendix reaching 2/3 of apical corial margin, apical cell 2 much shorter than broad; tylus nearly 2×

as broad as side piece of vertex, posteriorly reflexed; tegminal veins rather indistinct, largely not darker than ground color; pronotum with broad undulate intersecting rugae; maximum length of gena proper greater than minimum breadth of pleurostome; pronotum and scutellum bicolored..... **apicalis**

Tegmen either lacking such fascia and corial appendix reaching 1/2 of apical corial margin, or when apical fascia seldom present (in *tamangana* only) then corial appendix still shorter; apical cell 2 longer than broad; tylus not more than 1.5× as broad as side piece of vertex, posteriorly not reflexed.....3

3 (2). Pronotum coarsely rugose; tegminal veins very prominent, deeply pigmented; maximum length of gena proper and minimum breadth of pleurostome subequal; outer margin of eye and hind margin of head well separated; basicostal triangle and apical cells of tegmen distinctly depressed.....**tumidula**

Pronotum either punctate or finely striate; tegminal veins except rarely at apical area, rather indistinct, largely or entirely not darker than ground color; maximum length of gena proper usually much less than minimum breadth of pleurostome; outer margin of eye nearly touching hind margin of head; basicostal triangle and apical cells of tegmen weakly depressed..... 4

4(3). Pronotum and scutellum deeply, very densely micropunctate, giving surface velvety appearance; crown similarly sculptured as pronotum; corial appendix extending well beyond midpoint of apical corial margin.....**fulva**

Pronotum and scutellum striate or coarsely reticulate-punctate, never velvety in appearance; crown coarsely punctate or irregularly rugose; corial appendix usually not extending beyond midpoint of apical corial margin..... 5

5 (4). Crown, pronotum and scutellum all coarsely, deeply reticulate-punctate; veins at apical portion of tegmen prominent and deeply pigmented; scutellum shallowly depressed at disc 6

Crown irregularly rugose; pronotum and scutellum transversely or obliquely striate; tegminal veins all improminent and not darker than ground color..... 7

6(5). Carina separating supra-antennal triangle from side piece of vertex much weaker than antennal ledge and anterior margin of tylus; median length of crown (in its vertical view) much more than side length; tylus 2× as long as ocellar area; body size larger, length ♀ 6.5 mm; tegminal veins enclosing preapical cells continuously dark brown.....**borneensis**

Carina separating supra-antennal triangle from side piece of vertex as strong as antennal ledge and anterior margin of tylus; median and side lengths of crown (in its vertical view) virtually equal; tylus less than 1.5× as long as ocellar area; body size smaller, length ♀ 5 mm, ♂ 4.8 mm; tegminal veins enclosing preapical cells sparsely dotted with dark brown..... **pahangana**

7(5). Tegmen practically unicolored, lacking brown granules or fasciae; striae on disc of pronotum proper shallow, mostly oblique to median line; preapical cells of tegmen punctate throughout ..... **viridicans**

Tegmen with distinct brown granules and/or brown fasciae or stripes..... 8

8(7). Rugae or transverse striae on pronotum virtually not intersecting but parallel or subparallel to one another; in addition to brown granules on veins, tegmen with 1 broad conspicuous brown-black apical fascia and with fasciae or large spots both near base and across middle..... 9

Rugae on pronotum extensively intersecting and strongly undulating; tegmen lacking any apical fascia, at most with brown granules on veins, or large brown spots near middle or apex, or brown at base..... 10

9(8). Tegmen with only 1 black-brown fascia (at apex) which is longer and wider than darker markings (not complete fasciae) at base and at middle; corial appendix only reaching 1/3 of apical corial margin. Body ♀ 6.5 mm long...**tamangana**

Tegmen with 3 complete fasciae, 1 each at apex, near middle and next to base and with mid fascia wider than apical fascia; corial appendix reaching 1/2 of apical corial margin. Body ♀ only 5.3 mm ..... **striata**

10 (8). Tegmen basally greenish yellow, similarly colored as pronotum and scutellum; striae on disc of pronotum mostly oblique to median line; scutellum barely convex ..... **taiwana**

Tegmen basally brownish, distinctly darker than pronotum and scutellum; striae on disc of pronotum mostly perpendicular to median line; scutellum distinctly convex..... **nitida**

Subgenus **Hindola** Kirkaldy, s. s.

Carystus Stål 1862: 303 (preoccupied, not Hübner 1819 in Lepidoptera). 2 spp. included, no type designation.

Hindola Kirkaldy 1900: 243 (n. name for *Carystus* Stål not Hübner). Orthotype: *Ptyelus viridicans* Stål.

Modiglianiella E. Schmidt 1912: 173. Orthotype: *Modiglianiella sumatrensis* E. Schmt. (syn. of *Ptyelus viridicans* Stål). Wrongly cited as *Modiglianella* by Lallemand (1912: 7, 12), Baker (1919: 67; 1927: 539) and Haupt (1924: 299).

Quinquatrus Distant 1916: 197. Orthotype: *Quinquatrus dohertyi* Dist. (syn. of *Ptyelus viridicans* Stål).

Parahindola Baker 1927: 537. Haplotype: *Parahindola borneensis* Bkr.

Metahindola Lallemand 1951: 87. **New Synonymy.** 1 sp. included, no type designation.

Body proportionally narrower and head dorso-ventrally less compressed than in *Platycotta*. Postclypeus more or less oblique in profile. Crown moderately long (median length and side length usually subequal), well depressed, either irregularly rugose or densely micropunctate; tylus much narrower than eye, as broad as or slightly broader than side piece of vertex; eye slightly broader than long; ocello-ocular distance 2× interocellar distance. Pronotum with transverse rugae or striae and/or with rather evenly distributed punctures; ante-callus area depressed and dissimilarly sculptured as pronotum proper. Scutellum lacking median carina. Tegmen extensively punctate at basal 1/2 or 2/3 of corium and entire clavus; rm_1 shorter than rm_2, mcu convergent to ambient vein on approaching claval furrow; corial appendix reaching 1/2–2/3 of apical corial margin.

RANGE: Ceylonese, Malaysian and Indo-Chinese subregions, lowland and submontane; 11 species.

Hindola(Hindola) apicalis Maa, n. sp. Figs. 6 S–T, 25O.

Female: Head testaceous; postclypeus with 8 brown transverse lines at each side; crown with a broad brown transverse fascia occupying most part of tylus and anterior part

of side piece of vertex; eye greyish, traversed by a broad purplish band at middle. Pronotum brown, with a broad, inverted U-shaped, testaceous marking running along anterior margin and most part of posterolateral margin (humeral area brown) and a large blackish marking at middle of posterior margin. Scutellum reddish brown, lateral margin narrowly testaceous. Venter of body testaceous; venter of mesothorax black; abdominal tergites 4–6 and 9 black. Tegmen almost clear hyaline; costal margin broadly yellowish, with brownish streak along basal portion of vein Sc; anal margin narrowly brown; apical margin (not incl. appendices) broadly brown; veins around apical cells brownish, others not darker than ground color. Legs brownish; tibial spines apically black.

Anteclypeus weakly convex; postclypeus micro-alutaceous, anteriorly more flattened than posteriorly, lateral rugae indistinct except in color; gena also micro-alutaceous; lorum 3/4 as broad as pleurostome which is hardly broader than length of gena proper. Crown strongly depressed, lacking distinct punctures; tylus nearly 2× as broad as side piece of vertex, transversely depressed, finely longitudinally striated, posteriorly reflexed; side piece of vertex micro-alutaceous, anteriorly feebly rugose; supra-antennal triangle large, partly visible in vertical view of crown; tentorial pit roundish, quite shallow; occipital margin strongly reflexed; ocellar area more than 2× as long as broad, transversely depressed, weakly, irregularly rugose; ocellus closer to tylus than to occiput; interocellar distance 5/6 of ocello-ocular distance. Pronotum lacking median carina, with broad shallow undulate and intersecting rugae but no distinct punctures except immediately caudad to calli; ante-callus area almost smooth; calli all shallow, transverse, close to anterior margin; anterolateral margin slightly shorter than ocellar area; posterior margin deeply sinuate. Scutellum weakly rugose, feebly, extensively depressed, laterally carinate throughout; scutellar apex flattened, micro-alutaceous. Tegmen much more sparsely punctate at preapical and discoidal cells than costal area; apical cells smooth, concave, cell 2 much shorter than broad; vein R forked beyond midpoint; basicostal triangle shallowly depressed; corial appendix reaching 2/3 of apical margin; clavus shallowly, confluently punctate. Segment 1 of hind tarsus shorter than 2+3. Relative lengths and breadths of head, pronotum and scutellum 10 : 28 : 31 and 40 : 39 : 17 respectively. Body length 6.5 mm; tegmen 5.1 mm long, 2.2 broad.

JAVA: Holotype ♀ (BRN), Banjoewangl, 1911, MacGillivray, det. L. Melichar as *Pectinariophyes pectinaria* Kirk.

This is a very distinct species because of the pale markings on pronotum and scutellum, the apically fasciate tegmen, the broad and strongly depressed tylus, the broadly rugose pronotum, and the exceptionally short apical cells and the large corial appendix of tegmen. Some of its characters are unusual for the genus *Hindola* and indicate affinities to *Chaetophyes*, and superficially it looks rather similar to *Ch. lubricans* n. sp. of New Guinea.

Hindola (Hindola) pahangana (Lallemand), n. comb. Figs. 6 U–V, 14 A–D, 25P.

Parahindola pahangana Lall. 1951 : 86.

Male: Dorsum of body ochraceous, with brown punctures and numerous irregular brown markings; face brownish black, slightly paler at upper 1/3 of postclypeus; venter of mesothorax largely brownish black; abdomen brown. Tegmen almost colorless, basal 1/4 slightly brownish; costal and apical margins and all veins with scattered brownish

black granules; veins mostly colorless, those enclosing apical cells brownish black and diffused in color. Legs brownish black, fore and mid tibiae, all tarsi, and apices of all femora brown.

Anteclypeus strongly convex, not keeled. Postclypeus broadly flattened and with coarse shallow punctures at disc, depressed and with coarse irregular rugae at side of crater-like protuberance; crater-like protuberance 2× as long as broad, feebly rimmed at summit; lateral rugae weak. Gena and lorum micropunctate, with indistinct fine striae. Crown short, with coarse deep confluent punctures; anterior margin distinctly carinate, subparallel to occipital margin; tylus obliquely plane, its median carina hardly definable, transverse ridge near middle also weak, lying more anteriorly than that described and figured by Baker for *borneensis*; side piece of vertex not depressed; tentorial pit transverse, rather deep; occipital margin gently curved and reflexed throughout; ocellar area raised, weakly descending forward, 1/2 as long as interocellar distance. Pronotum similarly sculptured as crown, but punctures deeper and more evenly distributed, punctural interspaces mostly subequal to punctural diameter; median carina feebly indicated at anterior 1/5; anterolateral margin shorter than interocellar distance. Scutellum more sparsely unevenly punctate than pronotum and, in profile, lying on same level as posterior convexity of pronotum; discal depression broad, very shallow, not rimmed; apex flattened, feebly wrinkled. Tegmen with

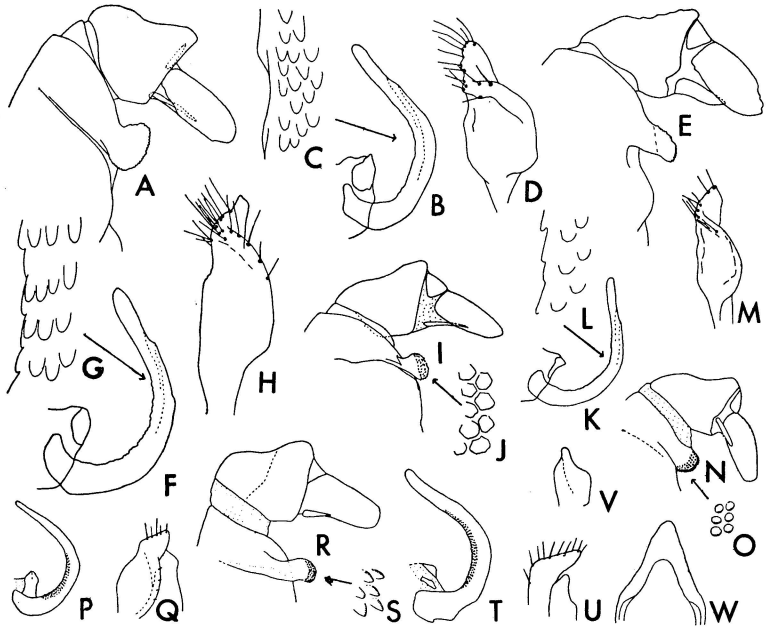

Fig. 14. *Hindola* (*Hindola*) spp., ♂ genitalia, upper part, side view (A, E, I, N, R); scabrous area of pygofer, sculpture (J, O, S); aedeagus and periandrium, side view (B, F, K, P, T); aedeagal scales (C, G, L); paramere, side view (D, H, M); paramere and basal plate, side view (Q, U); basal plate, side view (V); periandrium, top view (W). A–D, *pahangana* Lall.; E–H, *tumidula* Maa, holotype; I–M, *viridicans* Stål from Malaya; N–Q, *nitida* Bkr. from Borneo; R–W, *fulva* Bkr. from Borneo. Figures drawn at different magnifications.

coarse shallow punctures along costal margin, along basal abscissae of Rs and M, and at clavus, elsewhere smooth; corial veins weak, but those enclosing apical cells fairly prominent and their granules more or less bullate; venation similar to that of *borneensis* as figured by Baker, but cellules between costal margin and R_1 fewer in number, preapical cell 2 basally broader; apical and preapical cells all depressed; corial appendix only reaching midpoint of preapical cell 2; tegminal apex more rounded than in *borneensis*; clavus with triangular tumescence at apex of branch 1 of claval vein; basal portion of claval vein 2 absent or weak. Body length 4.8 mm.

Female: Similar. Disc of postclypeus slightly flattened, with some shallow coarse indistinct punctures. Interocellar distance 2× median length of vertex. Body length 5 mm.

MATERIAL EXAMINED: MALAYA: Holotype ♂ (BMNH), Soengei Tembeling, Pahang; 1♂ (BISHOP), Kuala Tahan to Kuala Terenggan, Pahang, 15. XII. 1958, T. C. Maa. SUMATRA (?): 1♀ (WSW), "bei Tebing tinggi", 4. IX. 1924.

The differences in tegminal venation (with a supernumerary apical cell near claval furrow and lacking of crossveins between costal margin and R_1 in the type) may be reckoned as individual variation. The different shape of the postclypeus in this and the next species, emphasized by Lallemand, is actually nothing but a sexual character of the genus. I am not quite sure about the collecting data of the ♀ specimen, but it is apparently of the same species. The crossveins between its costal margin and R_1, as in the ♂, are hardly visible; and preapical cell 3 has a short brown fascia near middle.

Hindola (Hindola) borneensis (Baker), n. comb.

Parahindola borneensis Bkr. 1927: 537, pl. 2 (13–15).

Female: Anteclypeus not keeled; postclypeus minutely punctate, discal area slightly flattened, with coarse scattered punctures and near top with rather large, deep pit. Gena proper transversely depressed at inner 1/2; pleurostome deeply punctate, with weak indication of longitudinal striae; lorum and gena proper shallowly striate-punctate (Baker wrote: "subantennal portion of cheek thickly rugose, subocellar [apparently err. for subocular] area transversely wrinkled, lorae [sic] coarsely punctate"); maximum length of gena proper subequal to minimum width of pleurostome. Crown much longer than in *pahangana*, similarly punctate as in that species; anterior margin strongly carinate at middle, weakly so at sides, not parallel to occipital margin; antennal ledge strong and visible in vertical view of crown; tylus feebly depressed, 2× as long as ocellar area, its median carina much weaker than its arcuate transverse carina; ocellus much closer to tylus than to occipital margin (in Baker's figure, it is equidistant from the two); side piece of vertex slightly depressed, much narrower than tylus, separated from supra-antennal triangle by a weak carina. Shape of tentorial pit, ocellar area and pronotum similar to that in *pahangana*. Sculpture of pronotum rougher than in *pahangana*, longitudinal rims of reticulation more or less weaker than transverse ones, and mostly narrower than meshes. Scutellum less densely sculptured than pronotum, meshes almost all much narrower than rims; discal depression shallow, ill demarcated (Baker said "has a thickly obtuse and a little raised rim"), although seemingly more conspicuous than in *pahangana*; scutellar apex more flattened than in *pahangana*. Clavus punctate at basal 1/3 and along claval veins. Other characters as in original description and in key to species given above.

Male: Similar to ♀, slightly smaller, postclypeus typical for the genus. (Genitalia not

examined).

MATERIAL EXAMINED: BORNEO: Holotype ♀ (USNM), Sandakan; Neallotype ♂ (BMNH, ex Lallemand coll.), Bukit Raja.

Borneensis and *pahangana* are closely related. The partly exposed supra-antennal triangle (in vertical view of crown) and strongly pronotal and scutellar sculpture give them a superficial similarity to *Pectinariophyes*. But the size of corial appendix, the smoothness of apical corial area and the scheme of tegminal venation are typical for *Hindola*.

Hindola (Hindola) tumidula Maa, n. sp. Figs. 6 W–X, 14 E–H, 26A.

Male: Greenish brown, venter shining black. Brightly brownish red at crown, supra-antennal triangle, ante-callus area of pronotum and a large diamond shaped mark at scutellar base. Fine irregular striae on pronotum and scutellum also brownish red. Crater-like protuberance of postclypeus and anterior end of mesepisternum brown. Tegmen black, slightly paler along basal 2/3 of costal margin, at discoidal cell and at corial appendix; preapical fascia obtriangular, flavo-hyaline, formed by apical 1/3 of costal margin, apical 1/2 of preapical cells 1 and 3, and basal 1/2 of apical cells 1 and 2; anal margin broadly greenish brown; apical 1/3 of clavus largely flavo-hyaline; costal and apical margins and all veins with large scattered piceous granules; veins all brightly brownish red, but branches of R inside preapical fascia brown. Legs brownish black, fore and mid femora and tibiae each with 3 narrow brown stripes; coxa, trochanter and bases of lateral tibial spines of hind leg all brown.

Postclypeus almost horizontal in profile, with coarse sparse shallow punctures; crater-like protuberance prominent, ovoid, about as wide as basal antennal segment, its summit depressed and clearly rimmed; lateral rugae short, broad and shallow. Gena and lorum longitudinally rugose-punctate; relative breadths of pleurostome and lorum and length of gena proper 4 : 2.5 : 3. Crown almost plane, irregularly rugose throughout; side piece of vertex feebly depressed; tentorial pit transverse, moderately deep; supra-antennal triangle about 2/3 as long as broad, not depressed; occipital margin weakly reflexed; tylus 2× as broad as long, hardly depressed, anteriorly narrowly rounded; ocellar area weakly convex. Pronotum and scutellum with coarse, rather shallow rugae; ante-callus area obliquely punctate-rugose; calli all transverse, shallow; apical 1/3 of scutellum smooth. Tegmen deeply punctate, except apical 1/3 of corium; veins all very strong; basicostal triangle moderately depressed; apical and preapical cells concave; vein R_1 closer to costal margin than to Rs; rm very short; preapical cell 1 much narrower than apical cell 1; preapical cell 2 short, subtriangular, corial appendix reaching only 2/5 of apical corial margin. Relative lengths and breadths of head, pronotum and scutellum 7 : 22 : 25 and 32 : 35 : 14 respectively. Major lateral spine of hind tibia proportionally stouter and longer than that in *viridicans*. Body length 5.6 mm; tegmen 4.5 mm long, 2.2 broad.

N. BORNEO: Holotype ♂ (BISHOP 3216) Mt. Kinabalu, 3650–3960 m, 27. X. 1958, L. W. Quate.

Aside from the characters given in the foregoing key, couplet 3, this species can be easily distinguished from other members of the subgenus by the much darker color pattern and stronger tegminal punctation.

Hindola (Hindola) viridicans (Stål) Figs. 14 I–M, 26B.

Ptyelus viridicans Stål 1854: 251.
Carystus viridicans, Spångberg 1877: 13 (redescr.).
Modiglianiella sumatrensis E. Schmidt 1912: 175, fig. (unnumbered), ♂♀. **New Synonymy.**
Quinquatrus dohertyi Distant 1916: 197, fig. 151.—China IN Baker 1927: 546, pl. 4 (1) (descr.). **New Synonymy.**
Hindola viridicans, Baker 1927: 540, pl. 2 (16–21) (descr.; Singapore).
H. dohertyi (p. 10)+*H. sumatrensis*+*H. viridicans*, Metcalf 1960: 10, 13.

Postclypeus oblique in profile, microsculptured, rather shining, its lateral transverse lines indistinct; median tubercle (♂) less prominent than in *tumidula*, its summit weakly rimmed and not depressed. Gena proper as long as breadth of lorum, both microsculptured. Crown almost plane, irregularly rugose; tylus nearly 2× as broad as long, anteriorly broadly rounded and distinctly rimmed; occipital margin reflexed near tentorial pit; ocellar area shorter than interocellar distance, as long as supra-antennal triangle; tentorial pit transverse, deep; side piece of vertex weakly depressed. Pronotum proper with fine, dense, oblique, intersecting striae at sides of median line and a few intermingling punctures, striae at anterior portion deeper and more oblique than those at posterior portion; ante-callus area irregularly rugose. Scutellum feebly rugose, its disc sometimes flattened or weakly depressed; apex depressed, microsculptured. Tegmen coarsely, shallowly punctate; all apical cells and preapical cell 2 slightly concave, largely smooth, punctures occurring only at sides of veins; veins and transverse ridge near middle both indistinct; R_1 equidistant from costal margin and Rs; rm_1 proportionally longer than in *tumidula*; preapical cell 1 as broad as apical cell 1; corial appendix reaching 1/2 of apical corial margin. Relative lengths and breadths of head, pronotum and scutellum 6 : 19.5 : 22 and 30.5 : 33.5 : 15 respectively (measured from 1♀ from Penang). Body length ♂ 3.5–4.0 mm, ♀ 4.5–5.0.

HOST PLANT: Probably a *Melastoma* sp. (Melastomaceae).

MATERIAL EXAMINED: TENASSERIM: 1♂, 2♀♀ (BMNH, Holotype ♀, and paratypes of *Quinquatrus dohertyi*), Myitta, W. Doherty. MALAYA: 6♂♂, 4♀♀ (USNM), Singapore, C. F. Baker; 1♂, 1♀ (BMNH), same; 1♂, 2♀♀ (STK, ex C. Stål coll.), Malacca, wrongly labelled as paratypes; 7♂♂, 6♀♀ (BISHOP), Kuala Tahan to Kuala Terenggan, 200–220 m, Pahang State, 15. XII. 1958, Maa; 9♂♂, 5♀♀ (BISHOP), Penang, 22–26. XII. 1958, Maa; 2♀♀ (USNM), same, Baker; 8♂♂, 4♀♀ (BISHOP), Subang Forest Reserve nr. Kuala Lumpur, 12–13. III. 1958, Maa; 1♀ (BISHOP), Kepong For. Reserve nr. Kuala Lumpur, 12. III. 1958, Maa; 1♂ (BISHOP) Connaught Bridge nr. Kuala Lumpur, 14. III. 1958, Maa; 1 ♀ (BMNH), Dusun Iva, Selangor, VII. 1921, H. M. Pendlebury; 1 ♀ (BMNH), Bukit Chuakah For. Reserve, Selangor, VI. 1921; 1 ♂, 2 ♀♀ (BMNH), Kuala Lumpur, IX. 1922, Pendlebury. SUMATRA: 1♂, 1♀ (LDN), Tandjon Morawa, NE Sumatra, 16. XII. 1954, J.v.d. Vecht; 1♂, 2♀♀ (WSW, cotypes of *Modiglianiella sumatrensis*), Padang, 1936, E. Modigliani. JAVA: 1♂, 2♀♀ (incl. Holotype) (STK), Java (no further details); 1♂ (LDN), Bogor (Kp. Sawah), 300 m, 22. IX. 1953, Vecht. BORNEO: 11♂♂, 9♀♀ (BISHOP), Santubong, 50 m, Sarawak, 18–30. VI. 1958, T. C. Maa; Kampong Pueh, nr. Lundu, 50 m, Sarawak, 6–12. VI. 1958, Maa; 2♂♂, 1 ♀ (BISHOP), Bau, 100 m, Sarawak, 29–30. VIII. 1958, Maa; 1♀ (BISHOP), Paring, nr. Ranau, 750 m, N. Borneo, 8–11. X. 1958, Maa; 2♂♂, 4♀♀ (HSPA), Pontianak, F. Muir; 2♂♂, 2♀♀ (BMNH), same. AMBOINA: 7♀♀ (HSPA), Muir.

This is a fairly common species in the low waste-land of Malaysia. Its absence at Sandakan area is noteworthy. The occurrence at Amboina most probably resulted from recent accidental introduction.

The tegminal punctures are mostly the same as the ground color, those on the anal margin are often colorless and clearly transparent, hence giving a brownish appearance when the tegmina are closed. The clavus, particularly at its anal margin, is semitransparent and richly tinted with greenish yellow.

A direct comparison of a ♀ paratype of *Quinquatrus dohertyi* Dist. with the type series of *Ptyelus viridicans* Stål left no doubts that they are conspecific. Distant (1907: 109, 1916: 195) did not include or redescribe *viridicans* in the Fauna of India series, but under the heading of the genus *Hindola*, he wrote: "Type, *H. viridicans* Stål, from Java, Singapore and Tenasserim." This probably indicates he first considered his Tenasserim specimens to be *viridicans* and later changed his mind and described them as *Quinquatrus dohertyi*, new genus and species.

An examination of the cotypes of *Modiglianiella sumatrensis* Schmt. definitely established the synonymy of both the genus and species. To avoid possible confusion in the future, I am selecting the ♂ cotype in the Warsaw Museum as the lecto-holotype, and one of the 2 ♀ cotypes as lecto-allotype. The left tegmen and wing of the lecto-holotype have been spread out and most probably Schmidt's figure was based on that specimen.

This species differs from its relatives in having a much paler color pattern and more extensively punctate tegmen.

Hindola (Hindola) taiwana (Kato), n. comb. Figs. 6 Y–Z, 26C.

Machaeropsis taiwana Kato 1933: 32, fig. (unnumbered), ♀.

Female: Pale greenish yellow. Face largely brown; crown with some brown punctures; pronotum with brown transverse band in line with calli. Tegmen clear hyaline; basal 1/5 greenish yellow, not transparent; veins colorless, with scattered brown granules which are slightly broader than veins; costal, apical, and distal 3/5 of anal margins also with brown granules; preapical areas of corium and of clavus with 2 and 1 brown markings respectively. Venter of mesothorax dark brown. Hind tibial and tarsal spines apically black.

Crown rather long, with a faint median carina; tylus subangulate anteriorly, its median length distinctly greater than side length; ocellus slightly closer to occipital margin than to tylus. Pronotum proper with no distinct punctures but fine, slightly intersecting transverse striae, the anterior ones not so strongly oblique as in *viridicans*; ante-callus area deeply punctate, with a short median carina. Tegmen with apical and preapical cells 2 much narrower than 1; apical cells entirely and preapical cells apically smooth. Relative lengths and breadths of head, pronotum and scutellum 9 : 23 : 23 and 32 : 35 : 14 respectively. Further characters similar to *viridicans*. Body length 5.5 mm; tegmen 4.4 mm long, 2.2 broad.

Male (undescribed): Similar, tegmen very thin. Anterior carina of crown very sharp. Body length 3.9 mm.

MATERIAL EXAMINED: TAIWAN: Holotype ♀ (TCM), Koshun (=Hungchuen), IV. 1923. VIETNAM: 1♀ (BISHOP), Aphung, Lam, 1100 m, 30. IX. 1960, C. M. Yoshimoto;

neallotype ♂ (BISHOP), Di Linh (Djiring), 1200 m, 22–28. IV. 1960, L. W. Quate.

This is an intermediate form of *viridicans* and *nitida* insofar as the general features and pronotal sculpture are concerned. In color pattern, it is closer to the latter. The longer tylus and untransparent tegminal base separate it from both of them. The species was wrongly listed by Metcalf (1960: 15) from Japan.

Hindola (Hindola) nitida Baker Figs. 6 AA–BB, 14 N–Q, 26D.

Hindola nitida Bkr. 1927: 542, pl. 3 (29–31), ♀♂.

Female: Relative breadths of lorum and pleurostome and length of gena proper 2.5 : 4 : 2. Crown with coarse shallow irregular rugae, anteriorly less sharply separated from postclypeus than in *viridicans* or *fulva*; tylus flattened, 2.5× as broad as long; supra-antennal triangle rather long, moderately punctate; side piece of vertex very weakly concave; tentorial pit transverse, fairly shallow; ocellar area not raised medially, feebly descending forward; ocellar area longer than interocellar distance. Pronotum nearly 2/3 (20 : 31.5) as long as wide; anterolateral margin shorter than interocellar distance. Scutellum proper fairly convex, about 1/5 as long as deep in profile. Tegmen very thin, coarsely punctate at basal 1/2 and at costal area, punctural interspaces mostly subequal to punctural diameter; apical and preapical cells hardly depressed; basicostal triangle more depressed than in *viridicans*.

Male: Similar. Postclypeus more distinctly flattened and as in *viridicans* and *fulva*, its crater-like tubercle 2.5× as long as wide, deeply depressed, sharply rimmed. Crown anteriorly sharply marked-off from postclypeus. Scutellum proper less convex than in ♀. Further characters as in original description.

MATERIAL EXAMINED: N. BORNEO: 1♂, 4♀♀, 1 intersex (USNM, syntypes), Sandakan; 1 teneral ♂ (BISHOP), Tenompok, 1460 m, Mt. Kinabalu, 17–21. X. 1958, Maa.

The teneral ♂ from Tenompok is pale greenish yellow, its crown and ante-callus area very lightly tinted with brownish, tegmen clear hyaline (yellowish at basal 1/4), with brownish granules, and scutellum basally depressed.

One of the ♀ syntypes, bearing Baker's red name label "*Neohindola nitida* Baker" is here selected as the lecto-holotype, and the unique ♂, the lecto-allotype. The name *Neohindola* has never been published.

Hindola (Hindola) tamangana (Lallemand), n. comb.

Metahindola tamangana Lall. 1951: 87.

Female: Body dull brown, darker at gena, lorum, scutellar apex, lateral area of thoracic venter, legs and abdominal apex. Tegmen almost clear hyaline; clavus basally tinted yellow; granules on veins and margins brown-black; large, irregularly-shaped spots at base of corium (incl. basal 1/2 of basicostal triangle) and near apex of clavus (discontinuously extending to center of corium) brown-black; apical fascia also brown-black, covering apical part of apical cells 2 and 3, whole of cell 1 and becoming paler and diffusing to apical corial margin and corial appendix.

Maximum length of gena proper and minimum width of pleurostome subequal. Crown irregularly rugose; tylus flattened, nearly 3× as wide as long, its posterior end wider than side piece of vertex (18 : 12); side piece of vertex also flattened but depressed at outer

side of ocellar area and of tentorial pit; ocellar area slightly shorter and more raised than tylus, about as long as wide, medially raised; ocellus equidistant to tylus and occipital margin; occipital margin evenly reflexed. Pronotum with slightly undulating and intersecting rugae, no punctures, no median carina. Scutellum weakly convex, with shallow, non-intersecting rugae. Tegmen thin, with scattered brown granules as in *nitida* and *striata*, apical and preapical cells concave, very weakly wrinkled; corial appendix only reaching 1/3 of apical corial margin (*i. e.*, to anterior margin of apical cell 3). Relative lengths and widths of head, pronotum and scutellum 17 : 48 : (?) and 67 : 70 : 34 respectively. Body 6.5 mm long.

MATERIAL EXAMINED: MALAYA: Holotype ♀ (BMNH), Lubok Tamang.

This species can be easily recognized by its comparatively large size, short corial appendix and beautifully marked tegmen. Its closest relative appears to be the next species.

Hindola (Hindola) striata Maa, n. sp. Figs. 6 CC–DD, 26E.

Female: Similar to *nitida*. Anterior margin of crown sharply carinate and slightly reflexed. Pronotum proper with deep dense fine parallel (virtually non-intersecting) transverse striae and few fine intermingling punctures. Scutellum barely convex, with shallower striae and denser punctures than pronotum. Tegmen with brown granules as in *nitida*; extreme base greenish yellow, followed by a black, curved fascia; discal area with a broad brown fascia extending from M to anal margin; apical fascia slightly darker and much narrower than discoidal one, undulating, running more or less along apical marginal (ambient) vein. Relative breadths of head, pronotum and scutellum 33 : 33.5 : 15. Body length 5.3 mm.

JAVA: Holotype ♀ (USNM), Mt. Gede, Tjibodas, 2100 m, Bryant & Palmer.

The deep and non-intersecting pronotal striation and the trifasciate tegmen of this species are unique for the genus.

Hindola (Hindola) fulva Baker Figs. 6 EE–FF, 14 R–W, 26F.

Hindola fulva Bkr. 1927: 541, pl. 3 (25–28), ♀♂.

Male: Teneral specimen pale yellow, slightly tinted with greenish. Postclypeal tubercle brownish red. Crown, pronotum and scutellum almost uniformly reddish brown, the latter 2 parts also with fine scattered dark-brown dots, pronotum with a narrow yellow band immediately behind ante-callus area. Tegmen clear hyaline, with few fairly small, brown granules along veins and margins; basicostal triangle yellowish; basal 1/2 of anal margin broadly yellowish greenish; apical corner of clavus slightly yellow or brownish; ambient vein brownish, others whitish or colorless. Tibial and tarsal spines of hind leg apically black. Matured specimen as described by Baker (*l. c.*).

Postclypeus with some coarse shallow punctures and obsolete transverse lines at sides; crater-like tubercle 1/2 longer than broad, its summit weakly rimmed and depressed. Crown weakly concave, similarly sculptured as pronotum and scutellum, but with some coarse punctures along anterior margin; tylus sometimes with weak median carina. Pronotum and scutellum uniformly covered with very dense minute deep punctures, giving surface velvety appearance; ante-callus area irregularly punctate-rugose; anterolateral margin as long as interocellar distance; apical 1/4 of scutellum depressed and feebly wrinkled;

scutellum and anterior 1/2 of pronotum with faint median carina. Relative lengths and breadths of head, pronotum and scutellum 5.5 : 17 : 20 and 28 : 29.5 : 13 respectively. Body length 4.2–4.4 mm.

Female: Similar to ♂. Punctures at sides of postclypeus indistinct. Dorsum of body chestnut brown. Tylus anteriorly subangulate. Tegmen with a short brownish fascia near middle running from M to clavus. Body length 5 mm. Further characters similar to *viridicans* and as in original description.

MATERIAL EXAMINED: MALAYA: 1 ♂, 7 ♀♀ (USNM, syntypes), Singapore. BORNEO: 1 teneral ♂ (BISHOP), Bau, 240 m, Sarawak, secondary forest nr. lake area, 29–30. VIII. 1958, Maa; 1 ♂, 1 ♀ (BMNH), Brunei.

The velvety appearance of the dorsum makes the recognition of this species easy and unmistakable.

One of the ♀♀ in the type series bears Baker's red name label "*Neohinhola fulva* Baker" [*Neohindola* is a manuscript name]. It is here selected as the lecto-holotype, the unique ♂ in the series, as the lecto-allotype.

Subgenus **Platycotta** Maa, n. subgen.

Orthotype: *Hindola* (*Platycotta*) *prostrata* Maa, n. sp.

Body fairly broad. Head strongly compressed dorso-ventrally. Postclypeus (♀) horizontal in profile. Crown very long, obliquely plane, coarsely, scatteredly punctate; tylus as broad as eye, much broader than side piece of vertex; eye much broader than long; ocello-ocular distance only 1/2 longer than interocellar distance. Pronotum coarsely, unevenly punctate, lacking rugae or striae; ante-callus area not depressed but similarly sculptured as pronotum proper. Scutellum medially carinate. Tegmen punctate at basicostal area and discoidal cell, elsewhere smooth; rm_1 and rm_2 subequal in length, mcu parallel to ambient vein; corial appendix reaching 2/3 of apical corial margin. Male unknown.

RANGE: Malaysian subregion, montane; 1 species.

The name is derived from the Greek, *platys*, level, flat; *kotta* (fem. gender), head. The subgenus may eventually prove to be a distinct genus. Pending on the discovery of the ♂, it is provisionally placed under *Hindola*.

Hindola (**Platycotta**) **prostrata** Maa, n. sp. Figs. 6 GG-HH, 26G.

Female: Bright greenish yellow, with following brownish black markings: 5 transverse stripes at each side of postclypeus, 1 transverse line on gena (lorum, anteclypeus and rostrum almost entirely black), 3 oblique subparallel stripes at each side of crown, 1 rather broad transverse stripe on ante-callus area, numerous irregular dots on pronotum proper (most of the dots forming together undulating transverse lines), a broad longitudinal stripe formed by dots at each side of median scutellar line, scattered granules on tegminal veins. Tegmen hyaline; black at basal 1/3 and at costal marginal cells near tegminal apex; bright greenish yellow at basicostal triangle, on all veins and at anterior stripe of clavus. Thorax below and legs brownish black; basal 1/2 of fore and mid tibiae yellow; coxa, trochanter, tibia (basal 1/4), lateral tibial spines (excl. apices) and tarsomere 1 of hind leg all brownish. Apical abdominal tergites laterally brown.

Body shining all-over. Postclypeus smooth, with few blackish punctures near lower end; relative breadths of pleurostome and lorum and length of gena proper 5 : 3.5 : 3; pleurostome longitudinally depressed; anteclypeus convex, finely punctate at sides. Crown with few coarse punctures superposing black markings; its anterior margin sharply carinate; occipital margin shallowly sinuate, weakly reflexed; tentorial pit large, very shallow; ocellar area separated by an oblique suture from side piece of vertex; transverse frontal suture parallel to occipital margin. Pronotum weakly convex, with coarse scattered shallow elliptic (not roundish) punctures superposing black markings; calli small, transverse, indistinct; median carina entirely absent. Scutellum proper weakly convex, with broad distinct median carina, at sides of which are weak short rugae and rather fine punctures; scutellar apex depressed. Tegmen almost uniformly smooth, with only some dense punctures at basicostal triangle and scattered ones at discoidal cell; disc of corium and clavus both convex; basicostal triangle and apical and preapical cells distinctly concave (these convexities and concavities much stronger than in *tumidula*); R_1 apically convergent to costal margin, Rs and M subparallel, rm_1 and rm_2 parallel. Relative lengths and breadths of head, pronotum and scutellum 10 : 23 : 25 and 34 : 37 : 16.5 respectively. Body length 5 mm; tegmen 4.4 mm long, 2.2 broad.

BORNEO: Holotype ♀ (BISHOP 3218), Bundu Tuhan, 1200 m, Mt. Kinabalu, N. Borneo, 17–18. II. 1959, Maa.

Subfamily MACHAEROTINAE (Stål) 1858

Characters as in the tabulation on pp. 7–8.

RANGE: Almost throughout the Oriental Region, westward to Punjab in NE India and eastward to New Guinea and Woodlark Is., but not found in the Bismarck Archipelago. A few odd species found in S. Japan and Australia. Altogether 2 tribes, 9 genera, 57 species.

This subfamily is much more homogeneous than the Enderleiniinae. Not only is the sculpture of the pronotum and scutellum fairly uniform throughout the subfamily, but the shape, texture and venation of the tegmen and wing are quite similar to one another. Furthermore, the nymphal tubes, as far as known, are all straight and subcylindric, and the nymphs are also similar.

The more important generic characters are: the relative stoutness of the body, lengths of legs and tegmen and convexity of pronotum; presence or absence of the vertical head process, lateral pronotal laminae and lateral hind tibial spine; and basal position of the scutellar process. Most of these characters are not inter-linked, so that the 2 tribes Maxudeini and Machaerotini are less significantly different than the 2 tribes of the previous subfamily. In couplet 4 of the following key to tribes and genera, the presence or absence of the head process rather than that of the lateral hind tibial spine, is purposely employed. I should have reversed the arrangment so as to make the grouping of the genera of the Machaerotini more natural, but it seems rather impracticable since I often found specimens lacking hind legs or glued on paper points. The probable interrelationship of the genera is shown in figs. 33 and 35.

KEY TO TRIBES AND GENERA OF MACHAEROTINAE

1. Body very thick and stout, hind femur about 2.5× as long as broad, length of

hind tibia only about 3/4 breadth of head; abdomen (♀) subcylindric, its apex vertically subtruncate in profile; pronotum strongly humpbacked, not or hardly less than 2× as broad as head, its lateral angle usually produced into large acute lamina; tegmen only about 2.5× as long as broad; claval vein 1 strongly curved at apex, 2 apically perpendicular to anal tegminal margin; longitudinal vein 5 of wing (except in *Conditor*) branched at apex; inner margins of eyes strongly convergent near posterior ends; tylus with a large deep subtriangular depression; scutellum with or without submedian carinae (rims of sulcus); hind tibia always with a strong lateral spine near middle (Maxudeini) 2

Body fairly slender, hind femur about 3.5× as long as broad, length of hind tibia equal to or slightly smaller than breadth of head; abdomen (♀) subconic, apically attenuate and distinctly oblique in profile; pronotum weakly humpbacked, usually less than 2× as broad as head and lacking distinct lateral lamina; tegmen 3× or more as long as broad; claval vein 1 weakly curved at apex, 2 (when present) apically forming acute interior angle with anal tegminal margin; longitudinal vein 5 of wing always unbranched; inner margins of eyes slightly convergent near posterior ends; tylus convex, flattened or vertically produced, seldom with small, shallow, roundish depression; scutellum always with submedian carinae; hind tibia with or without lateral spine near middle (Machaerotini) 4

2 (1). Scutellar process stout, slightly longer than scutellum proper, originating from postero-superior corner of the latter; lateral lamina of pronotum apically directed dorsolaterad; submedian carinae of scutellum obsolete ..... **Maxudea**

Scutellar process slender, only 3/5 or 1/3 as long as scutellum proper, originating from or below midpoint of postero-inferior margin of the latter; lateral lamina of pronotum (when present) horizontal; submedian carinae of scutellum well developed 3

3 (2). Scutellar sulcus as broad at middle as smallest interocular distance and strongly narrowed at both ends; scutellar process about 1/3 as long as scutellum proper; lateral angle of pronotum broadly rounded, not ampliate into horizontal lamina ..... **Conditor**

Scutellar sulcus evenly narrow, only about 1/3 as broad as interocular distance; scutellar process about 3/5 as long as scutellar proper; lateral angle of pronotum acute, strongly ampliate into horizontal lamina ..... **Blastacaena**

4 (1). Head vertically produced into a distinct subconic process 5

Head normal, not vertically produced (but seldom horizontally produced), tylus flattened or evenly convex 8

5 (4). Discoidal cell of tegmen 4–5× as long as wide, its length distinctly greater than greatest width of tegmen; veins M and Cu basally independent of each other, joined by a short crossvein which forms basal margin of discoidal cell; height of head above eye more than 2× depth of an eye in profile; posterolateral angle of pronotum not spine-like ..... **Sigmasoma**

Discoidal cell of tegmen not more than 2.5× as long as wide, distinctly shorter than greatest width of tegmen; veins M and Cu adnate for some distance near base, crossvein at base of this adnation far from discoidal cell; height

of head above eye less than 2× depth of an eye in profile 6

6 (5). Scutellar process originating from postero-superior corner of scutellum proper; 4 vertical carinae on head process, anterior one broad, extending from midpoint of face to summit of process; lateral ones narrow, strong, rising from midway of process; posterior one only 1/2 as long as lateral carina; hind tibia with a lateral spine near middle; posterolateral angle of pronotum broadly rounded ..... **Grypomachaerota**

Scutellar process originating from midpoint of postero-inferior margin of scutellum proper; 1 vertical carina on head process, or when 4, then lateral and posterior carinae much longer than described above 7

7 (6). Posterolateral angle of pronotum spine-like; head process with 4 vertical carinae; hind tibia with a lateral spine near middle ..... **Platymachaerota**

Posterolateral angle of pronotum broadly rounded; head process with only anterior vertical carina; hind tibia lacking lateral spine ..... **Tapinacaena**

8 (4). Hind tibia with a lateral spine near middle; ocelli slightly closer to each other rather than to eyes; interocellar distance subequal to length of ocellar area at side; supra-antennal triangle scarcely haired, strongly raised along antennal ledge and strongly descending along inner margin; pronotum very short, laterally subangulate ..... **Romachaeta**

Hind tibia lacking lateral spine; ocelli distinctly further from each other than from eyes; interocellar distance at least 1/2 greater than length of ocellar area at side; supra-antennal triangle horizontal with long dense hairs; pronotum usually elongate ..... **Machaerota**

Tribe MAXUDEINI (E. Schmidt) 1907: 175

Characters as given in the key. Treated by Baker (1927: 531) and Metcalf (1960: 44) as an independent subfamily Maxudeinae and placed at the top of the family. The latter author even included *Promaxudea* (=*Machaerota*) in it.

RANGE: Malaysian subregion, lowland; 3 genera, 3 species.

Genus **Maxudea** E. Schmidt

Maxudea E. Schmt. 1907: 175. Orthotype: *M. crassiventris* E. Schmt.

Postclypeus evenly convex and not keeled at upper 2/3, with slight indication of a broad keel at lower 1/3. Antennal ledge obliquely straight in vertical view of crown. Pronotum about 1/2 as long as wide; lateral angle exceptionally large and laminate, apically directed dorsolaterad, not horizontal; posterolateral margin very deeply sinuate near posterior end. Scutellum lacking "neck" region in profile; superior margin in profile horizontal, straight; submedian carina (rim of sulcus) absent; sulcus replaced by a single longitudinal series of transverse, rather irregular carinae. Scutellar process longer than scutellum proper, stout, distinctly arched in profile, originating from dorso-superior corner of scutellum. Further characters similar to those of the next genus. Male unknown.

RANGE: Malaysian subregion, lowland; 1 species.

The large and upraised pronotal lamina of this genus is unique for the family and the low and submedially uncarinate scutellum, on the other hand, indicates affinities to the

subfamily Enderleiniinae.

Maxudea crassiventris E. Schmidt Figs. 15 A–B, 28A.

Maxudea crassiventris E. Schmt. 1907: 176, fig. 4, ♀.
Maxudea schmidtii Baker 1919: 77, fig. 1, ♀. **New Synonymy.**

Female: Anteclypeus and lower 1/3 of postclypeus with a faint broad keel, finely wrinkled (Baker wrote: "coarsely wrinkled"). Side piece of vertex broadly, strongly foveate at anterior 1/2, weakly convex at posterior 1/2; tentorial pit exceedingly deep, curving and reaching frontal suture; occipital margin strongly reflexed throughout; ocellus equidistant from tylus and occipital margin; ocellar area with a broad low carina at middle. Ante-callus area and posterolateral corner of pronotum stramineous. Scutellum with a faint median carina. Apical cells of tegmen weakly, irregularly wrinkled; M and apical ambient veins distinctly forming an acute interior angle. Length to abdominal apex 7.7 mm, to tegminal apices 8.4, to apex of scutellar process 8.4; breadth from tip to tip of pronotal laminae 5.2 (Baker's measurements 6.5, 7.5, 8 and 5 respectively); tegmen 7 mm long, 2.5 broad. Further characters as described by E. Schmidt and Baker.

MATERIAL EXAMINED: SUMATRA: 1 ♀ (LDN), verz. J. J. de van tot Nederveen Cappel. MALAYA: 1 ♀ (USNM, type of *schmidtii*), Penang.

The Sumatran ♀ before me represents a topotype of *crassiventris* and the 4th example known for the genus. The types of *crassiventris* (2 ♀♀, from Sumatra: Soekaranda, in Warsaw Mus.) are unavailable to me but from the specimens at hand and from original descriptions, there is no doubt that *schmidtii* is a synonym. The type of *schmidtii* is partly damaged.

Genus **Blastacaena** Maa, n. gen.

Orthotype: *Blastacaena rugiceps* Maa, n. sp.

Postclypeus strongly convex; keel strong, broad and running for its full length. Pleurostome very narrow at upper 1/2. Eye strongly swollen. Tylus transverse; occipital margin weakly sinuate at middle; antennal ledge strongly curved in vertical view of crown; ocelli slightly closer to eyes than to each other. Pronotum about 3/5 as long as broad; its anterior portion in profile strongly declivous; lateral angle horizontally laminate; anterolateral margin much longer than posterolateral margin; posterior margin broadly sinuate at middle; posterolateral angle acuminate, produced ventro-caudad. Scutellum with a distinct "neck" region in profile; its posterior 1/2 abruptly upraised; scutellar process only 3/5 as long as scutellum, slender, hardly arched, lying nearly on same level as anterior 1/2 of scutellum and originating below midpoint of postero-inferior margin; scutellar sulcus narrow, deep. Venation of tegmen and wing similar to that in *Maxudea*. Hind leg short, stout; coxa with a prominent tubercle at center of its lateral surface; tibia very robust at apex, with a stout lateral spine near middle; inner apical lobes of tarsomeres 1 and 2 slightly longer than outer ones. Male genital plate very broad; apical lobe of pygofer broadly truncate, scarcely produced.

RANGE: Malaysian subregion, lowland; 1 species.

As far as the scutellar process is concerned, *Blastacaena* is rather similar to *Platyma-*

chaerota, *Conditor* and *Tapinacaena* but otherwise they have no true close affinities. The name of the new genus is derived from the Greek *blastos*, bud and *akaina* (fem. gender), spine or thorn, here referring to the scutellar process.

Blastacaena rugiceps Maa, n. sp. Figs. 15 C–D, 16 A–E, 26N.

Male: Black, with few pale markings. Lorum tinted with greenish; anteclypeus dark brown; supra-antennal triangle anteriorly greenish. Pronotum with some large brownish-yellow irregular markings about disc, and greenish yellow ones near anterolateral margin and narrowly along posterior margin; punctures on these pale markings brown. Scutellum similarly marked with brownish and greenish yellow, but lacking the ordinary pale lateral stripe; postero-inferior margin, and most part of scutellar process as well, whitish, the latter black at both ends. Tegmen brownish, with rosy purple lustre, darkest narrowly along costal margin and at extreme base, palest at sub-basal area; veins blackish brown, all with minute blackish setigerous punctures; apical veins much paler; outside of apical marginal vein with some brown granules which are as wide as vein. Laminate process of mid coxa and lateral surface of metathorax largely greenish. Abdominal tergites greenish to brownish yellow along median line.

Postclypeus minutely punctate, lower area with coarser punctures; median line broadly strongly keeled; lateral sides each with about 12 (incl. 2 on tylus) rather broad, very deep, transverse punctate lines. Crown micro-sculptured; tylus obliquely plane, strongly descending to lateral and transverse frontal sutures, with a median carina at posterior 3/4 and 2 oblique ridges running from posterolateral corners and merging into postclypeal keel; supra-antennal triangle weakly foveate; antennal ledge reflexed; side piece of vertex weakly convex at outer 2/3 and depressed at inner 1/3; tentorial pit transverse, very deep; ocellar area slightly convex; ocellus almost on occipital margin, the latter strongly reflexed. Pronotum coarsely, deeply and sharply reticulate; median carina high, narrow, but at both ends very weak; calli all roundish; ante-callus area finely reticulate; lateral angle acute, its oblique ental carina high, narrow and exceptionally long; anterolateral margin weakly curved in S-shape, its posterior 4/5 strongly reflexed; posterolateral submarginal area very broadly depressed. Scutellum similarly sculptured as pronotum; its sulcus practically parallel-sided, deep, 3/5 as long as scutellum, wrinkled at bottom; rim of sulcus explanate, lateral surface below strongly depressed; basidorsal carina of scutellar process evenly narrow. Tegmen smooth all-over; veins very thick; length to width of discoidal cell 21 : 10; apical cells distinctly concave; extreme apex and appendix of corium wrinkled. Relative breadths of head, pronotum and scutellum 33 : 62 : 29. Body length 7–7.5 mm, to apex of scutellar process 6.5; tegmen 5 mm long.

Female: Similar, slightly paler on pronotum. (The allotype ♀ is teneral, its body almost uniformly brown, tegmen yellowish, veins yellow.) Sculpture on postclypeus weaker; oblique ridges of tylus less prominent; supra-antennal triangle deeply foveate. Pronotum with coarser reticulation; calli all obliquely elongate. Scutellum slightly more highly raised posteriorly; sulcus widest behind middle, very smooth inside and almost smooth on outside of its rim. Body length 8.3 mm, to apex of scutellar process 8; tegmen 7–7.5 mm long.

BORNEO: Holotype ♂ (BISHOP 3220), Liawan, 300 m, nr. Keningau, N. Borneo, 14–19. I. 1959, Maa; paratype ♂ (BMNH), Midden, E. Borneo, 31. VIII. 1925, H. C. Siebers; paratype ♀ (BMNH), Kuching, Sarawak, 21. V. 1913. "KEI IS.": Allotype ♀ (WN),

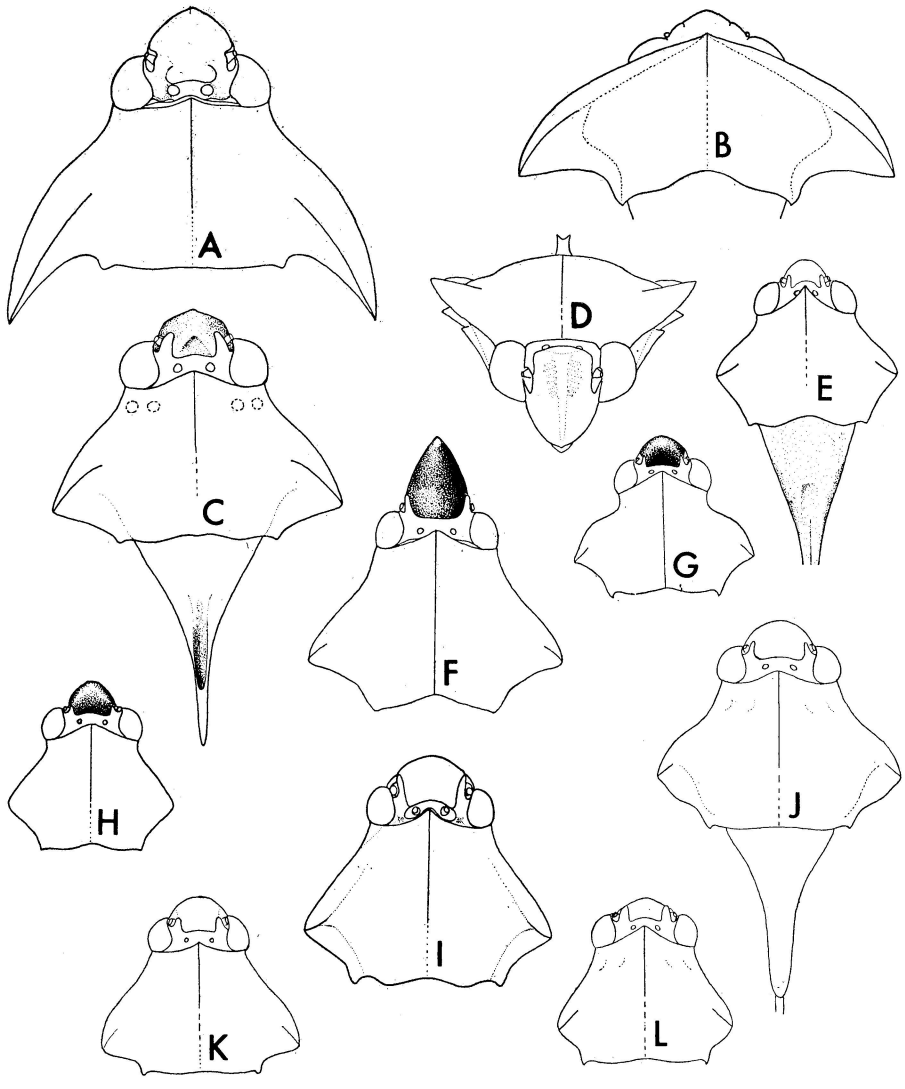

Fig. 15. Maxudeini and Machaerotini, head, pronotum and scutellum (scutellum not shown in A, F–I, K–L), drawn to same scale. A, B, *Maxudea crassiventris* E. Schmt., ♀ from Sumatra (B, viewed vertically to the plane of scutellum); C, D, *Blastacaena rugiceps* Maa, holotype ♂ (D, front view); E, *Romachaeta brachynotum* Maa, holotype ♂; F, *Sigmasoma chakratongi* Maa, holotype ♂; G, *Platymachaerota gressitti* Maa, holotype ♂; H, *Tapinacaena sigmatoides* Maa, holotype ♂; I, *Machaerota finitima* Jac., holotype ♀; J, *M. ampliata* Maa, holotype ♀; K, *M. humboldti* Lall., ♀ from Hollandia; L, *M. woodlarki* Maa, holotype ♂.

Key Tual, Rohde, H. Fruhstorfer. Probably wrongly labelled, since H. Fruhstorfer seems not to have been in the Key Is. It may be an error for Tandjoeng (=Cape or Kap) Tual at southernmost Sumatra.

Genus **Conditor** Distant

Conditor Dist. 1916: 184. Orthotype: *C. collatatus* Dist.

Postclypeal keel moderately strong, broad, complete. Upper 1/2 of pleurostome only about 1/2 as wide as antennal segment 1. Occipital margin rather deeply sinuate at middle; antennal ledge (in vertical view of crown) nearly straight. Pronotum about 2/3 as long as broad, slightly less than 2× as broad as head; its lateral angle weakly, horizontally ampliate, broadly rounded, not forming lamina. Scutellum with no "neck" region in profile, its posterior 1/2 gently upraised. Scutellar process 1/3 as long as scutellum; scutellar sulcus quite shallow, as wide as smallest interocular distance. Wing with unbranched longitudinal vein 5 (constant?). Male genitalia unknown. Other characters as in *Blastacaena* described above.

RANGE: Ceylonese subregion, lowland; 1 species.

Conditor is certainly a member of the tribe Maxudeini, but its non-laminate pronotum and unbranched longitudinal vein 5 of wing indicate tendency toward the next tribe Machaerotini. The very wide scutellar sulcus suggests superficial resemblance to *Apomachaerota* but its nearest relative is *Blastacaena*.

Conditor collatatus Distant

Conditor collatatus Dist. 1916: 185, fig. 141. S. India: Parambikulam, Cochin State (CCT).

Female (teneral): Brown, head and ante-callus area of pronotum darker and with richer reddish tints. Scutellum narrowly black on rim of sulcus and upper part of postero-inferior margin, yellow at base of process; lateral stripe narrow but conspicuous except at extreme base, slightly in S-shape, close to and apically convergent to latero-ventral scutellar margin and about 2/3 as long as scutellum; scutellar process brownish yellow, its sub-basal black spot indistinct. Tegmen brownish at apical 1/3, more or less paler at disc of cells; other 2/3 largely colorless, veins thereabout weakly and unevenly brownish, with scattered brown granules; costal margin dark brown at basal 1/2, paler at apical 1/2; anal margin entirely dark brown. Hind tibia not paler than hind femur; extreme apices of apical and lateral spines black.

Body densely covered with rather long hairs. Superior margin of head in profile semicircularly curved from occipital margin to lower end of postclypeus. Postclypeus smooth, shining; its lateral rugae only indicated by scattered punctures. Crown slightly roughened, and in profile, in line with general curvature of anterior 2/3 of pronotum; tylus strongly descending from its 4 margins, disc forming a deep smooth triangular depression, with no median carina; supra-antennal triangle not foveate; antennal ledge not reflexed; side piece of vertex almost flattened; tentorial pit transverse, deep; ocellar area longitudinally raised; ocellus equidistant to tylus and occipital margin which is scarcely reflexed. Pronotum shallowly, rather finely rugose-punctate; median carina narrow and rather high at anterior 1/2, obscure at other 1/2; calli roundish, small, shallow; ante-callus area finely punctate; lateral angle extending slightly beyond level of basal sclerites of tegmen, no oblique ental carina but entally with a longitudinal, weakly curved fovea running from outermost callus to posterolateral angle; anterior 1/3 of this fovea quite obscure, other 2/3 shallow but fairly distinct; anterolateral margin slightly curved, its anterior 1/2 gently descending lateroventrad, posterior 1/2 strongly carinate, narrowly ampliate, not reflexed; posterolateral

margin deeply sinuate, also strongly carinate and narrowly ampliate, its posterior 2/3 distinctly reflexed because of presence of above-mentioned longitudinal fovea; posterolateral angle sharp, well produced. Scutellum with coarser, deeper sculpture at base than pronotum; its profile depth about 1/2 of length; superior margin in profile quite gently curved, but forming distinct angle of about 120° with postero-inferior margin; sulcus and lateral surface (above lateral stripe) shining, scarcely punctate but (perhaps due to teneral state of the only specimen examined) irregularly rugose; area below lateral stripe deeply, sharply rugose; profile depth of scutellar process at extreme base subequal to length of postero-inferior margin above this process; upper part of postero-inferior margin bilaterally compressed, knife-like. Scutellar sulcus slightly depressed at vicinities of rim and median carina, otherwise raised as high as rim, about 2/3 as long as scutellum; median carina weak, running through sulcus; rim sharp, not explanate. Tegmen smooth all-over, apical cells strongly concave. Relative measurements (35 units=1 mm): width of head, pronotum, scutellum and scutellar sulcus 59 : 108 : 50 : 29; length of pronotum and scutellum (to end of sulcus) 81 : 80; smallest interocular distance 30; greatest width of tegmen 74; length and width of discoidal cell 46 : 27, of hind femur 39 : 16; length of hind tibia 50. Body length about 7 mm.

MATERIAL EXAMINED: S. INDIA: 1 ♀ (DHD), Fraserpet, N. Coorg, on spiked sandal, 19. IV. 1931, N. C. Chatterjee.

The shape and sculpture of the genus is unique and makes it unmistakably recognizable.

Tribe MACHAEROTINI (Stål)

Machaerotida Stål 1858: 233.
Sigmasomini [sic] + Machaerotini E. Schmidt 1907: 167.
Machaerotinae (Sigmasomini + Machaerotini) Baker 1927: 531.

Characters as given in the key.

RANGE: Same as the subfamily; altogether 6 genera, 51 species.

The tribal name Sigmasomini (or more correctly, Sigmasomatini) is here rejected. Its only characters listed by E. Schmidt and Baker (*l. c.*) are the presence of a head process and a lateral spine on the hind tibia. As a sequence of the discovery of the genera *Romachaeta*, *Conditor* and *Tapinacaena*, these 2 characters are no longer interlinked. Furthermore in the type genus *Sigmasoma*, there appear no characters which would justify the recognition of a separate tribe.

Genus **Romachaeta** Maa, n. gen.

Orthotype: *Romachaeta brachynotum* Maa, n. sp.

Body short, fairly slender. Crown exceptionally short, its median and side lengths subequal; supra-antennal triangle convex, strongly upraised along antennal ledge which is obliquely straight; eye strongly swollen; ocelli a little closer to each other than to eyes; lateral and transverse frontal sutures very deep; occipital margin deeply, angularly incised at middle. Pronotum about 1/3 broader than long; anterior margin pointed and produced forwards at middle, much shorter than posterior margin which is weakly bisinuate; antero-

lateral margin much longer than posterolateral margin; lateral angle narrowly rounded, with slight indication of ampliation; posterolateral angle acute, hardly produced. Scutellar sulcus shallow, moderately broad. Scutellar process nearly 2× as long as scutellum. Tegmen more than 3× as long as broad, discoidal cell moderately long, claval vein forked. Cubitus (longitudinal vein 5) of wing apically simple. Mesothorax laterally with a moderately strong discal tubercle; hind leg slender, long; tibia with a moderately strong lateral spine; inner apical lobe of tarsomere 1 distinctly longer than outer; that of tarsomere 2 almost 3× as long as outer and distinctly longer than basal lobe. Pygofer (♂) with a very long apical lobe below anal segment; anal style exceptionally short; genital plate very narrow. Female unknown.

RANGE: Indo-Chinese subregion, submontane; 1 species.

This new genus is superficially very similar to *Machaerota* Burm., and the anagram *Romachaeta* is suggested. It serves as an intermediate link between the tribes Maxudeini and Machaerotini and combines some characters which were formerly supposed to be peculiar to the tribes. The body is short but fairly slender, hind tibia slender and long, but with a distinct lateral spine, etc. The very short crown, obliquely straight antennal ledge and very deep transverse frontal suture, on the other hand, are not to be found in other genera of both tribes.

Romachaeta brachynotum Maa, n. sp. Figs. 15E, 16 F–I, 28B.

Male: Dirty yellow, slightly tinted with greenish, richly marked with brown. Head more or less brownish black. Postclypeus laterally yellow, with about 7 brownish transverse scarcely impressed lines. Supra-antennal triangle and anterolateral area of vertex yellowish. Pronotum with brown punctures; lateral angle black. Venter of mesothorax largely dull brown. Scutellum blackish brown; yellow on lateral stripe, on rims of dorsal sulcus and on lower 1/2 of postero-inferior margin; scutellar process black. Tegmen hyaline, dark brown at extreme base and on costal veins; other veins more or less paler; apical cells including their bordering veins yellow. Legs brown; mid femur with a yellow stripe; hind tibia except extreme apex yellow. Basal abdominal tergites greenish.

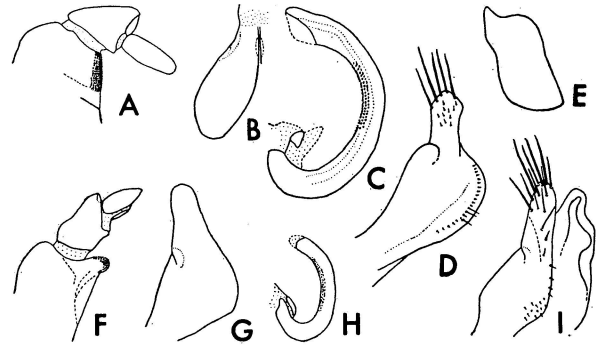

Fig. 16. *Blastacaena rugiceps* Maa, holotype (A–E) and *Romachaeta brachynotum* Maa, holotype (F–I). ♂ genitalia, upper part, side view (A, F); subgenital plate, apical part (B); aedeagus and periandrium, side view (C, H); paramere, side view (D, G); basal plate (E); paramere and basal plate (I). Figures drawn at different magnifications.

Postclypeus shining, with scattered minute punctures, lower 1/3 distinctly punctate; lateral yellow lines nearly as broad as brownish ones, and lined with hairs. Side piece of vertex very shallowly punctate, lying on oblique plane, with outer and anterior sides highly raised; supra-antennal triangle strongly sloping down to lateral frontal

suture; tentorial pit very deep, extending forward to frontal suture *via* outer margin of ocellus; occipital margin strongly reflexed; ocellar area also lying on oblique plane, strongly descending forward, medially narrowly carinate. Tylus anteriorly smooth and highly raised, posteriorly descending, distinctly punctate. Pronotum slightly convex, with coarse deep punctures, posterior 1/4 reticulate; longitudinal rims of meshes mostly narrower than transverse ones; ante-callus area wrinkled; lateral angle with oblique ental carina, protruding beyond level of basal sclerites of closed tegmen; anterolateral margin almost straight, its anterior 1/3 rounded off; posterolateral margin concavely curved, weakly reflexed; median carina well developed at anterior 2/3. Scutellum convex, sculptured as pronotum; dorsal sulcus 1/2 as long as scutellum, smooth, with a few scattered punctures, its lateral rims slightly convergent caudad. Scutellar process more than 2× as long as scutellum, strongly arched in profile; its basidorsal carina entering 1/3 of sulcus, posteriorly slightly widened; basilateral depression very long. Body length 7.0 mm, to end of scutellar process 7.5; tegmen 5.7 mm long.

THAILAND (NW): Holotype ♂ (BISHOP 3219), Chiangdao, 450 m, Chiangmai Prov., 5–11. IV. 1958, Maa.

Genus **Sigmasoma** E. Schmidt

Sigmasoma E. Schmt. 1907: 178. Orthotype: *S. bifalcatum* E. Schmt.

Body slender to moderately stout. Postclypeus vertically produced into head process; the latter about 2–5× as high as profile depth of an eye, with 3–4 carinae. Upper portion of pleurostome narrower than basal segment of antenna. Eye strongly swollen. Tylus forming hind surface of head process; occipital margin weakly or strongly sinuate at middle; antennal ledge strongly curved, its longitudinal section much longer than transverse section; ocelli closer to eyes rather than to each other. Pronotum about 2/3 as long as broad to slightly longer than broad, less convex than in *Grypomachaerota*, its lateral angle broadly rounded or strongly produced into angulate spreading lamina; anterolateral margin longer than posterolateral margin; posterior margin shallowly sinuate at middle; posterolateral angle subangulate, not protruding. Scutellum lacking distinct "neck" region in profile; scutellar process slender, as long as or longer than scutellum proper, originating from upper end of postero-inferior margin; scutellar sulcus narrow, deep. Tegmen more than 3× as long as broad; discoidal cell 4–5× as long as broad, longer than maximum tegminal breadth, and only slightly shorter than basal cell; claval vein unbranched. Cu (longitudinal vein 5) of wing unbranched. Hind leg slender or rather robust; tibia with lateral spine near middle; inner apical lobes of tarsomeres slightly longer than outer ones. Apical lobe of ♂ pygofer broadly truncate.

RANGE: Malaysian and Indo-Chinese subregions, lowland and submontane; 3 species.

This genus is mainly characterized by the strongly developed head process, very long tegmen and its discoidal cell. It was confused with *Grypomachaerota* by Baker (1919) who wrongly assigned his species *borneense* to the latter genus. The generic name is derived from the Greek, *sigma* (genit., *sigmatos*) S-shaped; *soma* (genit., *somatos*), body. It is of neuter, not feminine gender.

KEY TO SPECIES OF SIGMASOMA

1. Head process about 1/4 higher than length of pronotum, its posterior carina wanting, anterior carina strong; pronotum slightly longer than broad; scutellum in profile much shallower than long, its hind and inferior margins forming an obtuse angle. Length of tegmen ♀ 6.5 mm ..... ***bifalcatum**
   Head process distinctly lower than length of pronotum, with a knife-like carina on posterior surface, anterior carina distinct or obscure; pronotum shorter than broad... 2
2. Body dominantly blackish brown, large (tegmen ♂ 7.0 mm long); median carina on anterior surface of head process knife-like, equally strong as lateral ones and reaching summit of process; height of head above eye nearly 3× depth of eye; supra-antennal triangle distinctly foveate; lateral angle of pronotum strongly produced into angulate spreading lamina, with oblique ental carina ..... **chakratongi**
   Body dominantly straminious, small (tegmen ♀ 4.5 mm long); anterior carina of head process much weaker than lateral ones and not reaching summit of process; height of head above eye only 2× depth of eye; supra-antennal triangle convex; lateral angle of pronotum broadly rounded, not protruding out, lacking oblique ental carina ..... **borneense**

Sigmasoma chakratongi Maa, n. sp. Figs. 15F, 17 A–E, 28C.

Male: Dull reddish brown to piceous, with few pale markings. Head shining black; gena, lorum and side piece of vertex tinted with brownish. Pronotum dirty greenish brown, calli and punctures at posterior 4/5 dull brown to black. Scutellum including its postero-inferior margin almost uniformly dull reddish brown; lateral stripe oblong, yellow; apical 1/5–1/4 of scutellar process yellow. Venter of mesothorax shining black; laminate process of mid coxa and posterior 1/2 of lateral mesothoracic surface yellow. Tegmen pale yellowish, most of veins and apical 2/5 of costal margin piceous; claval furrow, ambient vein and apical abscissae of M and Cu brownish.

Postclypeus finely wrinkled, with about 9 transverse setose impressed lines at each side; median carina high and sharp at uppermost 1/3, gradually widened and weakened towards anteclypeus. Side piece of vertex finely punctate, with a somewhat S-shaped deep fovea running from tentorial pit to supra-antennal triangle; occipital margin deeply incised at middle and strongly reflexed at side; ocellar area slightly convex; ocellus closer to occipital margin than to transverse frontal suture. Height of head above eye nearly 3× depth of eye. Head process bilaterally compressed, with 4 and 1 knife-like carinae at upper 1/2 and lower 1/2 respectively (anterior carina complete, other 3 incomplete, lateral carinae slightly closer to anterior than to posterior carina); interspaces of carinae distinctly depressed; wrinkles on posterior surface stronger than those on lateral and anterior surfaces and becoming very fine near summit of the process. Pronotum strongly punctate-reticulate, roundish punctures occurring only at and near ante-callus area and near lateral angle; rims of reticulation-meshes at posterior portion narrower and sharper than those at anterior portion; anterior margin more narrowly rounded at middle than in *borneense*; ante-callus area laterally less strongly descending than in *borneense*; posterolaterel and posterior 1/2 of anterolateral margins strongly reflexed; lateral angle with oblique ental carina, apically slightly upraised and distinctly produced into angulate lamina; median carina weak at both ends, very strong before midpoint; posterolateral submarginal area broadly, strongly

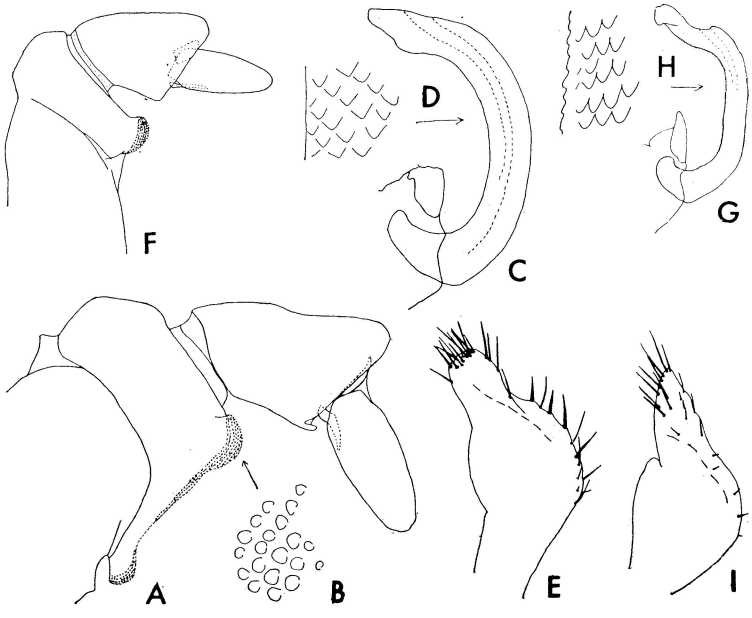

Fig. 17. *Sigmasoma* and *Grypomachaerota* spp., ♂ genitalia, upper part, side view (A, F); scabrous area of pygofer, sculpture (B); aedeagus and periandrium, side view (C, G); aedeagal scales (D, H); paramere, side view (E, I). A–E, *S. chakratongi* Maa, paratype; F–I, *G. turbinata* E. Schmt. from N. Borneo. All except B, D and H drawn at same magnification.

depressed. Scutellum similarly sculptured as pronotum, posteriorly strongly elevated; postero-inferior and ventrolateral margins in profile perpendicular to each other; dorsal sulcus widest near middle, with shallow coarse wrinkles, almost 2/3 as long as scutellum proper; basidorsal carina of apical process evenly narrow, basally not entering sulcus. Length of body from summit of head process toapices of closed tegmina 10.0 mm, to apex of scutellar process 10.0–10.5; length of tegmen 6.8–7.0.

THAILAND: Holotype ♂ (BISHOP 3221), Chiangdao, 450 m, Chiangmai Prov., NW Thailand, 5–11. IV. 1958, Maa. Paratypes, 1♂ (BISHOP), same data; 1♂ (BKK), same but collected by P. Phon.

The head process in this species is less developed than in *S. bifalcatum* E. Schm., but the pronotal laminae are about as large as those found in the tribe Maxudeini. It is my honor to name this notable species after a notable entomologist Prince Chakratong Tongyai of Thailand.

***Sigmasoma bifalcatum** E. Schmidt

Sigmasoma bifalcatum E. Schmt. 1907: 180, fig. 5, ♀ (as *bifalcata*). Type, Java (no further details) (WSW).

Sigmasoma borneense (Baker), n. comb. Fig. 26I.

Grypomachaerota borneensis Bkr. 1919: 74, pls. 2 (8, 9, 11) & 3 (1, 4, 5, 8), ♀.

Female: Lateral stripes of scutellum in dorsal aspect slightly narrowed and convergent caudad, in lateral aspect evenly broad, parallel to superior margin and ending at midpoint of scutellum. Fore and mid legs rather uniformly brown (fore femur piceous), darker at base, lacking pale markings; hind femur apically and tibia largely stramineous. Postclypeus including anterior surface of head process shining, finely wrinkled; yellow and dark transverse lines at side equally broad, former sparsely haired, latter nude and hardly impressed; median carina weak, rather broad, definable only at upper 1/2, almost reaching summit of head process; posterior surface of head process distinctly wrinkled; uppermost 1/3 of head process strongly compressed, pyramid-like, microsculptured, with 3 (2 lateral and 1 posterior) knife-like equally apart carinae. Side piece of vertex gently convex; supra-antennal triangle convex; longitudinal section of antennal ledge slightly longer than transverse section; tentorial pit transverse, very deep; ocellar area weakly raised along median line, anterolaterally strongly depressed, posteriorly weakly sinuate. Pronotum 3/4 as long as broad, rather evenly reticulate-punctate, punctures of even size and mostly roundish; ante-callus area laterally more strongly descending than in *chakratongi*; lateral angle broadly rounded, not angulate as in Baker's figure, not laminately produced, lacking oblique ental carina; lateral margin weakly reflexed; posterolateral submarginal area weakly, narrowly depressed. Scutellum proper with length to basal width 27 : 16; its sulcus almost 2/3 as long as scutellum; basidorsal carina of apical process slightly widened caudad. Body length 6.1–6.7 mm.

Male: Slightly smaller and darker, otherwise similar to ♀.

MATERIAL EXAMINED: N. BORNEO: 1♀ (BISHOP), Sandakan Bay SW, Sapagaya Lumber Camp, 2–20 m, 2. XI. 1957, Gressitt; 2♂♂, 4♀♀ (USNM, syntypes), Sandakan.

I am selecting the ♀ which bears Baker's red name label, as the lecto-holotype, and one of the ♂♂ as lecto-allotype. Baker mistook the entire type series as ♀♀.

Genus **Grypomachaerota** E. Schmidt

Grypomachaerota E. Schmt. 1907: 181. Orthotype: *G. turbinata* E. Schmt.

Rather similar to *Sigmasoma*, but differing in the following points: Head process less than 2× depth of eye. Supra-antennal triangle shorter; longitudinal and transverse sections of antennal ledge subequal in length. Pronotum more strongly convex, with weak median carina. Tegmen less than 3× as long as broad; discoidal cell not more than 2.5× as long as broad, much shorter than basal cell or maximum tegminal breadth, basally connected to R through a very long arm of M+Cu and basal abscissa of M; cell 1r never long and subtriangular. Apical lobe of ♂ pygofer narrowly rounded.

RANGE: Malaysian subregion, lowland; 2 (?1) species.

KEY TO SPECIES OF GRYPOMACHAEROTA

Height of head process much less than depth of eye; scutellar process strongly decurved, apically almost touching (only 1.5 mm apart) apices of closed tegmina, and

when a hypothetical straight line is drawn from summit of head process to apex of scutellar process, the postero-inferior corner of scutellum lies much above the line; scutellar sulcus nearly 2/3 as long as scutellum..... **breviceps**

Height of head process not less or even a little more than depth of eye; scutellar process at most moderately decurved, apically far above apices of closed tegmina, and when the above-mentioned line is drawn, the postero-inferior corner of scutellum lies on or below it; scutellar sulcus only about 1/2 as long as scutellum..... **turbinata**

***Grypomachaerota breviceps** Baker

Grypomachaerota breviceps Bkr. 1919: 75, pls. 2 (12, 15) & 3 (3, 7, 9). Type, Malaya: Penang, ♀ (USNM).

Most probably *breviceps* merely represents an extreme variant of *turbinata*. A re-examination of the unique type specimen failed to reveal any appreciable differences other than that given above. It is here temporarily treated as a distinct species only in hope of having more material to bring this extreme form still closer to typical *turbinata*.

Grypomachaerota turbinata E. Schmidt Figs. 17 F–I, 26J.

Grypomachaerota turbinata E. Schmt. 1907: 182, fig. 6, ♂♀.
G. tricolor Baker 1919: 75, pls. 2 (14) & 3 (2, 6), ♀. **New Synonymy.**

Male: Postclypeus micro-alutaceous, laterally almost touching eyes, with very short indistinct haired impressed lines; lower area punctate and weakly wrinkled. Crown short; occipital margin reflexed throughout and nearly touching tylus at middle. Side piece of vertex almost plane at disc; supra-antennal triangle raised; antennal ledge strongly curved; tentorial pit transverse, deep; ocellar area gently descending laterad; ocellus closer to occiput than to tylus; interocellar and ocello-ocular distances 4 : 2. Head process finely wrinkled, uppermost 1/3 rather smooth and a little depressed at interspaces of carinae; posterior carina stronger than anterior but weaker than lateral carina. Pronotum coarsely punctate-reticulate; anterior 1/2 of median carina rather strong, another 1/2 poorly defined; anterior area strongly sloping latero-ventrad; lateral margin largely reflexed; calli elongate, oblique; lateral angle broadly rounded, often with a very short oblique ental carina. Scutellum sculptured like pronotum; dorsal sulcus about 1/2 as long as the former, posteriorly slightly widened. Scutellar process moderately decurved; basidorsal carina evenly narrow or slightly widened posteriorly; basilateral depression a little longer than wide. Body length 5.2–5.5 mm.

Female: Similar. Body length 5.5–6.0 mm.

MATERIAL EXAMINED: MALAYA: 1♀ (STK) Perak; 1 ♀ (USNM, type of *tricolor*), Penang. SUMATRA: 3♂♂, 1♀ (LDN), Fort de Kock, 920 m, 1913 & XII. 1921, E. Jacobson; 1♂ (BMNH), Benkoelen, Marang-Liwa, coll. Noualhier. JAVA: 1♂ (LDN), Saerela, IV. 1878. N. BORNEO: 1♀ (BISHOP), Kiau, 1200 m, Mt. Kinabalu, 6. II. 1959, Maa; 2♂♂ (BISHOP), Liawan, 300 m, nr. Keringau, 14–19. I. 1959, Maa; 1♂, 1♀ (BISHOP), Kalabakan, 10–50 m, nr. Tawau, XI. 1958, Maa; 1 damaged example (BISHOP), Paring Hot Spring, 260 m, nr. Ranau, 23. I. 1959, Maa; 2 ♂♂, 1 ♀ (STK), "Borneo", Boucard; 1 ♂ (BRN), "Borneo", det. L. Melichar. BANGUEY: 1♂ (BRN), det. L. Melichar.

The types, from Java, Sumatra: Liangagas and Borneo: Mindai and not seen by me,

are in Warsaw, Berlin and Genoa museums.

Without actually seeing any authentic material of *turbinata*, Baker (*l. c.*) considered his *tricolor* a "very distinct species" and separated it from the former by the following couplet:

Scutellar spine but slightly longer than scutellum; height of head above eyes equal to depth of eye ..... *turbinata*
Scutellar spine 1/2 or nearly 1/2 longer than scutellum; height of head above eyes greater than depth of eye ..... *tricolor*

In E. Schmidt's and Baker's figures, the scutellar process is 1.44 and 1.36×, respectively, as long as scutellum. In the material at my disposal, it varies from 1.32–1.63×. And in the single ♀ from Kalabakan which is a little larger than average, the head process is 1/3 higher than depth of eye, but the ♂ from the same locality is a typical *turbinata*. In other ♀♀, the same ratio varies 1/8–1/4, and is uniformly a little higher than in ♂. In fact, these parts are so convex that their measurements can not be expected to always be absolutely accurate since it is very hard to place different specimens all in exactly the same angle for measuring. Baker also questioned whether all of E. Schmidt's material from Java, Sumatra and Borneo belongs to one species. A comparison of material at hand fails to disclose any definite difference, and I feel justified to sink *tricolor* as a synonym.

From the wording "a half or nearly a half.....", Baker probably had more than 1 specimen before him, but in the USNM, there is none besides the unique type.

Genus **Platymachaerota** E. Schmidt

Platymachaerota E. Schmt. 1919: 369. Orthotype: *P. elevata* E. Schmt.

Pronotum distinctly wider than long; its lateral margin strongly explanate; oblique ental carina long, strong; posterolateral angle spiniform. Scutellar sulcus long, deep, its rims strongly explanate in side view and meeting each other in an acute angle. Scutellar process straight or nearly straight in profile, originating from near midpoint of postero-inferior scutellar margin, basally strongly compressed bilaterally. Tegmen excessively long and narrow; claval vein running apart from claval furrow. Legs short; hind tibia much longer than hind femur. Other characters similar to *Grypomachaerota* E. Schmt. Male genitalia (of *P. gressitti*) also similar.

RANGE: Malaysian and Indo-Chinese subregions, submontane; 2 species.

As mentioned elsewhere in the paper, the profile outline of the scutellum in this genus and *Blastacaena* and *Tapinacaena* is similar but the 3 genera have no real close affinities. E. Schmidt (*l. c.*) emphasized that the occipital margin is more deeply incised and the head process higher and more sharply carinate in *Platymachaerota* than in its closest relative *Grypomachaerota*. With the inclusion of the new species described below, these characters are only of specific importance.

KEY TO SPECIES OF PLATYMACHAEROTA

Head process less high than depth of an eye, its carinae short and indistinct; lateral spine of hind tibia originating apicad to midpoint of the latter; scutellar process originating from slightly above midpoint of postero-inferior scutellar margin; ocelli

nearly equidistant to eyes and to each other..... **gressitti**
Head process much higher than depth of an eye, its carinae long and sharp; lateral spine of hind tibia originating basad to midpoint of the latter; scutellar process originating just at midpoint of postero-inferior scutellar margin; ocelli much closer to eyes than to each other..... **elevata**

Platymachaerota elevata E. Schmidt

Platymachaerota elevata E. Schmt. 1919: 370, ♀.

Female: Body in profile similarly shaped as in *gressitti*, except base of scutellar process much lower. Anteclypeus longer than wide, strongly and broadly raised at upper part along median line, its lateral part finely wrinkled and strongly descending; postclypeus convex, finely punctate, disc with some rather coarse punctures, lateral area finely transversely striate, and with broad and conspicuous transverse lines; median carina broad, running upward from disc and becoming stronger and narrower on approaching summit of head process. Head process much higher than depth of eye, transversely striate all-over; its summit acute both in side and front views; lateral and posterior carinae sharp, high at upper 2/3 and upper 1/2 respectively but indistinct at lower part; anterior carina (*i. e.*, median carina of postclypeus) much broader and weaker than upper parts of other carinae; interspaces of carinae strongly depressed. Side piece of vertex slightly depressed, irregularly rugose, gradually narrowed caudad; tentorial pit linear, transverse; ocellar area strongly descending laterad; ocelli much closer to eyes than to each other (3 : 5); occipital margin strongly reflexed for its entire length, angulately incised at middle where it cuts ocellar area into 2 parts. Pronotum deeply punctate-reticulate; meshes of reticulation slightly coarser at posterior area, and transverse rims sharper and closer to each other than longitudinal ones; median carina complete, sharp; anterolateral margin gently curved, rather narrowly explanate but strongly reflexed at posterior 3/4; posterolateral margin deeply sinuate, anteriorly broadly explanate; posterior margin shallowly sinuate; lateral angle narrowly rounded, extending much beyond level of basal sclerites of closed tegmen. Scutellum more coarsely sculptured than pronotum, particularly at area below rim of sulcus; no median carina; sulcus excessively deep, almost complete, lanceolate in outline, widest and deepest near apex. Scutellum in profile with superior margin abruptly curved between end of sulcus and base of process which arises from midpoint of postero-inferior scutellar margin and which is subequal in length to scutellum proper. Tegmen smooth, not wrinkled except apical margin outside of ambient vein; setigerous punctures on vein indistinct; relative length and width of discoidal cell 25 : 9. Legs stout; lateral spine on hind tibia very strong, arising before midpoint; inner apical lobe of hind tarsomere 2 slightly longer than outer one. Relative widths of head, pronotum and scutellum 24.5 : 46 : 21 (length of pronotum 35). Other characters as in original description. Body length 7.5 mm, to apex of scutellar process 7.7; tegmen 5.7 mm long, 1.7 mm wide.

MATERIAL EXAMINED: BORNEO: Holotype ♀ (BRN), no further details. The holotype is in fairly good condition, but it has been once heavily coated by mold and its fore and mid tarsi are partly incomplete.

Platymachaerota gressitti Maa, n. sp. Figs. 15G, 18 A–E, 26K.

Male: Dirty ochraceous, with many black and dark brown irregular markings. Lat-

eral stripe of scutellum roundish, yellow; lower portion of postero-inferior margin and basal spot of sulcus also yellow; scutellar process largely yellow, darkened at both extremes. Tegmen pale yellowish, veins at basal 1/3 brownish black, at remaining 2/3 yellow, lacking distinct brown granules. Legs brown, mid and hind femora darker. Abdomen dorsally yellow, marked with brownish black, ventrally brown.

Anteclypeus keeled at lower 1/3, finely wrinkled at side; postclypeus convex, smooth, shining, its lateral area sparsely punctate, hardly wrinkled; median carina broad and only feebly indicated near summit of head process. Head process lower than depth of eye and less acuminate than in *Grypomachaerota turbinata*, posterior carina hardly stronger than an-

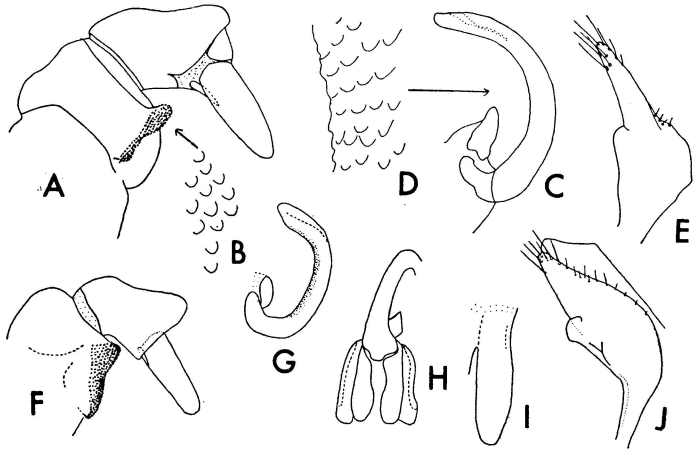

Fig. 18. *Platymachaerota gressitti* Maa, ♂ paratype (A–E) and *Tapinacaena sigmatoides* Maa, ♂ holotype (F–J). ♂ genitalia, upper part, side view (A, F); scabrous area of pygofer, sculpture (B); aedeagus and periandrium, side view (C, G); aedeagal scales (D); periandrium, basal plates, parameres and basal part of aedeagus, hind view (H); subgenital plate, apical part (I); paramere, side view (E); paramere and basal plate, side view (J). Figures drawn at different magnifications.

terior carina (*i. e.*, median carina of postclypeus) and lying at upper 1/4 of process; lateral carina poorly defined, narrower than and close to anterior carina; posterior slope finely wrinkled. Side piece of vertex finely, confluently punctate, strongly depressed; tentorial pit roundish, indistinct; ocellar area convex, also confluently punctate; ocelli hardly closer to eyes than to each other; occipital margin angulately incised at middle, strongly reflexed at side. Pronotum evenly, deeply punctate-reticulate, meshes of reticulation all about as long as broad; median carina narrow, high, but weak at both ends; anterior margin angulately produced at middle; lateral angle strongly horizontally ampliate, narrowly rounded and much surpassing level of basal sclerites of closed tegmen; posterolateral margin deeply sinuate and anteriorly broadly explanate; posterior margin shallowly sinuate at middle. Scutellum more coarsely sculptured than pronotum; sulcus deep, 2/3 as long as scutellum proper; superior margin in profile gently curved from end of sulcus to process; process slightly shorter than scutellum proper, arising slightly above midpoint of postero-inferior scutellar margin. Tegmen smooth; relative length and width of discoidal cell 16 : 7. Legs comparatively slender; lateral spine of hind tibia rather slender, arising after midpoint;

inner apical lobe of hind tarsomere 2 nearly 2× as long as outer lobe. Relative widths of head, pronotum and scutellum 18 : 32 : 15 (length of pronotum 23). Body length 5.2 mm, to apex of scutellar process 4.7–4.8; tegmen 4.2 mm long, 1.4 mm wide.

Female: Similar, not noticeably paler than ♂; carinae of head process slightly more prominent. Body length 6.3 mm, to apex of scutellar process 5.7.

VIETNAM: Holotype ♂ (BISHOP 3222), 20 km S of Dalat, 1300 m, 12. IX. 1960, Gressitt. Allotype ♀ and 1 paratype ♂, same data.

The claval vein is apically branched in all specimens of the type series. In addition to structural differences enumerated above, this beautiful species can be easily separated from *P. elevata* by its smaller size, variegate color markings and more northernly distribution.

Genus **Tapinacaena** Maa, n. gen.

Orthotype: *Tapinacaena sigmatoides* Maa, n. sp.

Body short, fairly slender. Postclypeus broadly keeled; crown anteriorly upraised into a vertical process, which is about 1/2 or 2/3 as high as depth of eye in profile and lacks lateral and posterior carinae. Ocelli closer to eyes than to each other; occipital margin shallowly sinuate at middle. Pronotum about 5/7 as long as broad; anterior margin shorter than posterior margin; posterolateral margin strongly concave, much shorter than anterolateral margin; lateral angle broadly rounded. Scutellar sulcus narrow; scutellar process slightly shorter than scutellum, originating immediately above midpoint of postero-inferior margin of the latter. Tegmen about 3× as long as broad; discoidal cell moderately long; claval vein usually forked. Cubitus (longitudinal vein 5) of wing simple. Mesothorax laterally with a strong discal tubercle. Hind leg fairly long and slender; tibia lacking lateral spine; inner apical lobe of tarsomere 1 slightly longer than outer lobe; that of tarsomere 2 nearly 2× as long as outer lobe and slightly longer than basal lobe. Apical lobe of pygofer (♂) short, narrow; anal style long, slender; genital plate short, broad.

RANGE: Indo-Chinese subregion, lowland and submontane; 2 species.

This new genus is similar to *Platymachaerota* and *Grypomachaerota* on the one hand, but the head process lacks lateral and posterior carinae and the hind tibia lacks lateral spine. On the other hand, it stands close to *Conditor*, but the scutellar sulcus is normal, not excessively broad and medially carinate, and the head distinctly vertically raised. The name is derived from the Greek *tapeinos* (low, humble) and *akaina* (a spine or thorn), in allusion to the low head and scutellar processes.

KEY TO SPECIES OF TAPINACAENA

Tylus distinctly shorter than broad when viewed vertically to its plane; pronotum narrowly rounded at lateral and posterolateral angles, subangularly sinuate at middle of posterior margin ..... **sigmatoides**

Tylus as long as broad when viewed vertically to its plane; pronotum very broadly rounded at lateral and posterolateral angles, very weakly curved at middle of posterior margin ..... **rotundata**

Tapinacaena sigmatoides Maa, n. sp. Figs. 15H, 18 F–J, 26L.

Male: Yellowish brown, with greenish tints, with brownish black punctures and some indistinct irregular darker markings. Postclypeus with, at each side, 11 (incl. 1 on tylus) brown transverse impressed lines which are about 1/2 as broad as their pale and haired interstices. Pronotum with a broad indistinct ∧-shaped pale mark; calli brownish black. Scutellum with 3–8 and 4–5 blackish spots on lateral surface and on rim of sulcus (both inner and outer sides) respectively; lateral stripe greenish white, broad, strongly curved, apically meeting sulcus; ventrolateral (posterior 1/3) and postero-inferior margins yellow; lateral surface dark brown; scutellar process brownish yellow, with fine brown spots. Tegmen pale yellowish; veins slightly darker, with a few brownish granules, diameter of which is subeqal to thickness of veins; anal margin and basal 1/2 of costal margin brown. Hind tibia yellow, with black spines. Abdominal tergites 3–4 yellow or yellowish brown, the succeeding ones medially yellow and laterally black.

Postclypeus micropunctate, upper 1/3 with broad strong keel. Crown densely pubescent; tylus (*i. e.*, posterior surface of head process) subtriangular, obliquely plane, slightly depressed immediately behind upper end of postclypeal keel, distinctly shorter than broad. Side piece of vertex hardly depressed; tentorial pit transverse, shallow; occipital margin angularly or subangularly incised at middle. Pronotum with deep, medium-sized punctures at median area, with punctural diameter subequal to punctural interspaces; ante-callus area with shallower and slightly sparser punctures; lateral area coarsely reticulate, with rims about 1/2 as broad as meshes; median carina evenly strong; anterolateral margin carinate for its full length, reflexed at posterior 3/4; lateral angle narrowly rounded, surpassing level of basal sclerites of closed tegmen, with a weak oblique ental carina; posterolateral submarginal area somewhat narrowly depressed; posterolateral angle narrowly rounded, not pointed, not protruding. Scutellum including its lateral stripe with similar sculpture as lateral area of pronotum; basidorsal area more coarsely reticulate; lateral surface weakly depressed below sulcus; sulcus quite deep, 3/4 as long as scutellum, slightly narrower than interocellar distance; process shorter than scutellum proper. Apical cells of tegmen partly wrinkled. Relative breadths of head, pronotum and scutellum 22 : 37 : 16. Body length 6.25 mm.

ASSAM: Holotype, ♂ (USNM), 16 km N of Tinsukia, 6. III. 1944, D. E. Hardy. Paratype, ♂ (BISHOP), same data.

Tapinacaena rotundata Maa, n. sp. Fig. 26M.

Female: Dirty yellowish brown. Postclypeus similarly colored as in *T. sigmatoides*, but impressed lines much paler, not darker than tylus, and their haired interstices and median line as well, yellow and improminent. Supra-antennal triangle also yellow. Pronotum yellowish along median line and lateral margin, reddish brown at ante-callus area, elsewhere tinted with dark green; punctures more or less darker than ground color. Scutellum similarly colored as in *sigmatoides* but postero-inferior margin above base of scutellar process brown, instead of yellow. Tegmen yellow; veins darker, lacking brownish granules; anal and basal 1/2 of costal margins brown. Venter of thorax, legs and abdomen almost uniformly ochraceous; tibial and tarsal spines of hind leg black.

Head process lower than in *sigmatoides*, less than 1/2 as high as depth of eye. Postclypeal keel not prominent. Crown rather sparsely pubescent; tylus as long as broad when viewed vertically to its plane. Ocellar area medially raised. Pronotum very broadly round-

ed at lateral and posterolateral angles; posterior margin broadly, shallowly sinuate; lateral angle lacking oblique ental carina, extending to level of basal sclerites of closed tegmen. Scutellum in profile not angulate at postero-superior corner, hardly longer than scutellar process (42 : 39). Apical cells of tegmen smooth. Other characters similar to *sigmatoides*. Relative breadths of head, pronotum and scutellum 22.5 : 37 : 18. Body length 6.4 mm.

HOST PLANT: *Zizyphus jujuba* Lamk. (Rhamnaceae).

THAILAND: Holotype ♀ (BISHOP 3223), Saraburi, on *Zizyphus jujuba*, 23. V. 1961, P. Phon. Paratypes, 1 ♀, same data; 1 ♀ (BKK), Bangkok, 1. VIII. 1959, Phon.

This species is so similar to *T. sigmatoides* that at first glance it was assumed to be the opposite sex of the latter. The main difference is the shape of the pronotum, but the discovery of the ♂ may provide further distinguishing characters.

Genus **Machaerota** Burmeister

Machaerota Burm. 1835 : 128. Haplotype : *M. ensifera* Burm.
Narnia Walker 1868 : 192 (preoccupied, not Stål 1862 in Coreidae). Haplotype : *N. rastrata* Wk.
Pachymachaerota E. Schmidt 1907 : 194. Orthotype : *Pach. nigrifrons* E. Schmt.
Conmachaerota E. Schmt. 1919 : 371. Orthotype : *Machaerota notoceras* E. Schmt.
Promaxudea Lallemand 1927 : 100. **New Synonymy**. Orthotype : *Prom. humboldti* Lall.
Eumachaerota E. Schmt. 1928 : 111. **New Synonymy**. Orthotype : *Eum. siebersi* E. Schmt.
Asichaerota Matsumura 1940 : 40 & 41 (as *Asimachaerota* on p. 39). **New Synonymy**. Orthotype : *Asichaerota taiheisana* Matsum.

Body slender. Postclypeus never vertically produced into head process. Upper portion of pleurostome as broad as or narrower than basal segment of antenna. Eye moderately swollen. Crown anteriorly broadly rounded, seldom subangularly produced forward; occipital margin usually weakly sinuate at middle; antennal ledge in vertical view of crown, gently curved; ocelli more or less closer to eyes than to each other. Pronotum gently convex, more or less broader than long; lateral angle seldom produced into spreading horizontal lamina; posterior angle variable; anterolateral margin longer or about as long as postero-lateral margin. Scutellum often with distinct "neck" region in profile; scutellar process slender, as long as or longer than (seldom slightly shorter than) scutellum proper, originating from upper end of postero-inferior margin of the latter; scutellar sulcus usually narrow and shallow. Tegmen about 3× as long as broad; discoidal cell 1.5–3.5× as long as broad, never longer than tegminal breadth; claval vein branched or unbranched. Cu (longitudinal vein 5) of wing unbranched. Hind leg slender; tibia lacking lateral spine; inner apical lobes of tarsomeres much longer than outer ones. Apical lobe of ♂ pygofer narrowly rounded.

RANGE: Same as subfamily; lowland, some submontane; 41 species.

This extensive genus can be recognized by the absence of the vertical head process and the lateral spine on hind tibia, in combination with the normal position and normal length of the scutellar process. Several attempts have been made by earlier authors to split it into genera which here are rejected. The type species of *Eumachaerota* and *Asichaerota* are unavailable to me, but from their original descriptions and from their originally included species, these names and *Narnia*, *Conmachaerota* and *Promaxudea* merely

represent extreme forms and all fall within limits of *Machaerota*. For convenience, 2 very weak subgenera may be recognized by the following couplet:

Posterolateral angle of pronotum rounded, never projecting ventrocaudad; lateral angle of the same never distinctly ampliate or laminate, never with strong and long oblique ental carina; antero- and posterolateral margins of pronotum often subequal in length; median pronotal carina usually weak; scutellum usually shallow in profile, sulcus usually shallow, often wide and short; scutellar process almost straight in profile, slightly shorter than or as long as scutellum proper; tegmen usually with apically unbranched claval vein, lacking supernumerary crossvein joining R (or Rs) and discoidal cell (syn.: *Narnia* Wk. not Stål, *Pachymachaerota*, *Asichaerota*)... **Machaerota**, s. str.

Posterolateral angle spine-like, distinctly projecting ventrocaudad; lateral angle of the same often distinctly ampliate or laminate and with long strong oblique ental carina; anterolateral margin of pronotum always longer than posterolateral margin; median pronotal carina usually strong; scutellum in profile always deep and arched at posterior portion, sulcus usually deep and narrow, always long; scutellar process usually strongly arched in profile, as long as or longer than scutellum proper; tegmen usually with apically branched claval vein, often with a supernumerary crossvein joining R (or Rs) and discoidal cell (syn.: *Promaxudea*, *Eumachaerota*)... **Conmachaerota**

As enumerated above, the only seemingly constant character is the relative acuteness of the posterolateral pronota langle, which was however overlooked by most earlier workers. At least at this moment, it is not advisable to introduce these subgeneric names into the system.

Machaerota is the largest genus of the family. The general structural features within the genus are fairly uniform and nearly all the species are quite localized in distribution. It may safely be assumed that the genus is still in its early phase of very active deviation and speciation. When it is more intensively collected and studied, some of the described species may prove to be of infra-specific category and more transitional forms and "cryptic" species are expected to be discovered. In the present paper, some of the odd specimens are left unnamed.

The chief specific characters in the genus are levied upon the general shape of the body, relative measurements of certain structures and details of the ♂ genitalia. When specimens are directly compared, the distinguishing characters are usually clear enough. But they may be impossible to be expressed concisely and exactly, or may not be sufficiently trenchant for using in a key. Furthermore, many of the species are known from very few examples and consequently the possible range of variation is uncertain; also some of them are known to me merely by inadequate descriptions. While endeavoring to incorporate them into the key, I fully realize this would only make it more artificial and unreliable. At the present time, however, there seems to be no way to avoid such serious handicaps, and the keys must be used with great caution. For practical reasons, instead of presenting a single long key to cover all species of the genus, it is divided, by zoogeographic subregions, into several keys.

Key to Machaerota species of Australian, Papuan and Wallacea Subregions

1. Posterolateral angle of pronotum broadly rounded, not projecting out; profile

depth of scutellar process at base subequal to length of postero-inferior margin of scutellum proper 2

Posterolateral angle of pronotum acute, projecting ventrocaudad; profile depth of scutellar process at base much greater than length of postero-inferior margin of scutellum proper 5

2 (1). Lateral angle of pronotum acute, with distinct oblique ental carina; scutellar sulcus deep and as long as scutellum proper, its anterior 1/3 shallower and not sharply rimmed at sides; discoidal cell of tegmen 1/2 longer than breadth of last apical cell ..... **foveata**

Lateral angle of pronotum broadly rounded, lacking distinct oblique ental carina; scutellar sulcus shallow or not depressed, usually not more than 1/2 as long as scutellum proper; discoidal cell of tegmen hardly or not longer than width of any apical cell 3

3 (2). Scutellum in profile excessively highly arched; tylus much shorter than ocellar area and only about 2× as wide as side piece of vertex; scutellar sulcus 2/3 as long as scutellum proper, not depressed, anteriorly with median carina ..... **nigrifrons**

Scutellum in profile hardly arched; tylus much longer than ocellar area and much more than 2× as wide as side piece of vertex; scutellar sulcus not more than 1/2 as long as scutellum proper, depressed, either posteriorly with median carina or the carina running through entire sulcus 4

4 (3). Crown anteriorly subangulate; scutellum proper shorter than its process; pronotum and scutellum of similar color; breadth of scutellar sulcus less than 1/2 of interocellar distance ..... **rastrata**

Crown anteriorly broadly rounded; scutellum proper longer than its process; pronotum black or nearly black, scutellum bright red or brown, in strong contrast; breadth of scutellar sulcus 1/2 of interocellar distance ..... **pugionata**

5 (1). Scutellum lacking pale lateral stripe; pronotum brown, its posterolateral and posterior margins pale ochraceous yellow; abdomen black; tegmen with a crossvein joining R and discoidal cell. Body length to apex of scutellar process 8 mm ..... ***siebersi**

Scutellum with a distinct ivory white lateral stripe near base; pronotum usually dark brown to black 6

6 (5). Lateral angle of pronotum very broadly rounded, lacking oblique ental carina, not ampliate beyond level of basal sclerites of closed tegmen; lateral stripe of scutellum short, almost straight ..... **moluccana**

Lateral angle of pronotum acute or narrowly rounded, with distinct oblique ental carina, ampliate well beyond level of basal sclerites of closed tegmen; lateral stripe of scutellum long, strongly curved 7

7 (6). Scutellum in profile deepest at point well before base of its apical process, about as long as deep at that point; apical 1/2 of tegmen distinctly stained with yellowish ..... **finitima**

Scutellum in profile deepest just at commencing of its apical process 8

8 (7). Scutellum nearly as long as deep in profile; pronotum more than 1.5× as broad as long, its lateral angle strongly ampliate and distinctly upraised at apex; body larger, ♀ 7.8 mm long ..... **ampliata**

Scutellum distinctly longer than deep in profile; pronotum less than 1.5× as broad as long, its lateral angle moderately ampliate and hardly upraised at apex; body smaller, ♂ 5.0–6.5 mm long, ♀ 5.5–6.5 9

9 (8). Anterolateral margin of pronotum practically straight, about as broadly compressed (dorso-ventrally) as posterolateral margin; postero-inferior margin of scutellum ivory yellow for its full length, as pale as lateral stripe; pronotum 2× as broad as long (42 : 21) ..... **humboldti**

Anterolateral margin of pronotum distinctly incurved near lateral callus, much more narrowly compressed than posterolateral margin; postero-inferior margin of scutellum slightly tinted with yellow at its lower portion, distinctly darker than lateral stripe; pronotum less than 2× as broad as long (39 : 23)... **woodlarki**

Machaerota finitima Jacobi Figs. 15I, 28D.

Machaerota finitima Jac. 1928: 45, fig. 30, ♀.

Female: Very similar to the next species. Paler, lateral stripe of scutellum slightly narrower. In profile, anterior end of head more raised and more distinctly subangulate, pronotum less convex, rim of scutellar sulcus less curved, and basidorsal carina of scutellar process distinctly lower than summit of scutellum, not in line with the latter. Tentorial pit roundish, moderately deep; occipital margin less deeply and less angularly incurved at middle; tylus obliquely flattened, posteriorly narrowed and evenly sloping down to transverse frontal suture. Pronotum 2× as broad as head (52 : 26); anterior 2/3 of median carina narrow, high and uninterrupted; calli all obliquely elongate, the inner one curved anteromesad and meeting median carina; anterolateral margin almost straight near lateral angle, and submarginally more deeply and more narrowly depressed; lateral angle weakly upraised and less ampliate. Scutellar sulcus slightly deeper, as broad as 1/2 of interocular distance. Lateral surface of scutellum weakly convex at center and behind that, obliquely depressed. Tegmen proportionally a little narrower. Anal segment and anal style short, subequal in length to each other. Body length to apex of scutellar process or of tegmen 7.5 mm, tegmen 5.78 mm long and 1.88 broad.

MATERIAL EXAMINED: Holotype ♀ (STK), Bellenden Ker Mts. The holotype is in good condition, although the hind part of body, including wings, has been broken off and glued on the locality label.

The shape of the scutellum in profile in this species is uncommon in *Machaerota* and bears similarity to that of *M. pugionata.*

M. finitima was originally described from 2 ♀ specimens. The paratype, which I did not see, from NE New Guinea (Torricelli Mts., Huon Penin.) (Metcalf 1960: 35 wrongly listed as Dutch New Guinea), is presumably not conspecific with the holotype, partly for zoogeographic reasons and partly because my Huon Penin. specimens belong to the next 2 species.

Machaerota ampliata Maa, n. sp. Figs. 15J, 28E.

Female: Piceous. Postclypeus laterally with about 8 silvery-haired yellow tranverse rugae which are much broader than interspacing weakly impressed lines. Vertex anteriorly suffused with greenish yellow. Scutellum ivory white on its basal band (which is short,

narrow, often concealed by pronotum), postero-inferior margin, and basidorsal carina of posterior process; lateral stripe also ivory white, evenly curved, posteriorly attenuate. Tegmen weakly tinted with yellowish; basal 1/3 of costal and anal margins dark brown; veins brownish yellow, the costal ones, especially radius and its branches, with brown setigerous punctures. Hind tibia yellow excepting both ends. Abdominal segments 3–4 and median area of apical tergites greenish yellow.

Postclypeus very sparsely micropunctate, lower 1/5 weakly wrinkled. Crown finely, densely punctate; side piece of vertex almost plane, anteriorly slightly raised, posteriorly with a deep transverse depression; occipital margin angularly incised at middle; tylus a little more elevated than side piece of vertex, very weakly convex, rather steeply sloping down to lateral and transverse frontal sutures; ocelli a little closer to eyes than to each other; ocellar area convex. Pronotum more than 2× as broad as head (55 : 26), coarsely, deeply punctate-reticulate; median carina comparatively strong, rather broad, poorly defined at both ends; calli all roundish; lateral angle and posterolateral margin obliquely flattened and distinctly ampliated, the former extending well beyond level of basal sclerites of closed tegmen; oblique ental carina exceptionally long and high; lateral submarginal area more or less strongly depressed, antero- and posterolateral margins both strongly incurved; posterolateral angle pointed and a little produced. Scutellum similarly sculptured as pronotum, with definable median carina extending from base to middle of sulcus; superior margin in profile almost straight along basal 2/5, weakly, evenly curved along remaining 3/5; lateral surface weakly depressed at disc. Scutellar sulcus about 2/3 as long as scutellum, distinctly narrower than 1/2 of interocular distance, shallow, slightly widened near apex and very coarsely wrinkled. Scutellar process relatively short, weakly arched; basidorsal carina scarcely entering sulcus, and in profile, in line with summit of scutellum; basilateral depression deep and long. Anal style much longer than anal segment. Body length 7.8 mm, to apex of scutellar process 8; tegmen 6.5 mm long.

NE NEW GUINEA: Holotype ♀ (BISHOP 3224), Lambaeb, 900 m, Salawaket (Saruwaged) Range, Huon Penin., 19. IX. 1956, E. J. Ford, Jr. Paratype ♀ (CAS), Finschhafen, Huon Penin., 17. IV. 1944, E. S. Ross.

Besides the types, there are 3 further ♀♀ from Waris, 450–500 m, 50 km S of Hollandia, W. New Guinea, 27–30. VII. 1959, Maa. They are temporarily referred to this species but not included in the type series. It is doubtful whether they represent a distinct race or even species. Their size is a little smaller, tylus not horizontal but slightly descending caudad, occipital margin less deeply incised at middle, median scutellar carina much weaker or absent and lateral pronotal area less strongly compressed dorsoventrally.

Machaerota humboldti (Lallemand), n. comb. Figs. 15K, 20 F–I, 26O.

Promaxudea humboldti Lall. 1927 : 100, ♀.

Male (undescribed) : Similar in color and structure to the preceding species. Pale lateral stripe of scutellum uniformly broad. Tegmen lacking distinct dark punctures along veins. Pronotum 2× as broad as long (42 : 21); calli elongate; lateral area far less upraised and ampliate; anterolateral margin practically straight, not incurved near lateral callus. Scutellum distinctly longer than deep in profile, strongly compressed bilaterally at posterior portion; median carina absent or hardly definable; sulcus usually parallel-sided, about 3/4 as long as scutellum. Pygofer posteriorly scarcely produced. Body length 5.0–

6.5 mm, tegmen 4.5–5.3.

Female: Similar, usually paler. Anal segment and anal style subequal in length. Body length 5.5–6.7 mm, tegmen 4.5–6.0.

MATERIAL EXAMINED: NE NEW GUINEA (all BISHOP): 8 ♂♂, 3 ♀♀, Bulolo, 690 m, on *Pipturus* sp., 16. VIII. 1956, E. J. Ford, Jr.; 1 ♂, Gewak, Salawaket (=Saruwaged) Range, 1530 m, 7. IX. 1956, Ford; Wewak, 2–20 m, 13. X. 1957, Gressitt; 1 ♂, 1 ♀ in copula, Lae, sea level, 26. VII. 1955, Gressitt; 5 ♀♀, Soitei Vill., 900 m, Torricelli Mts., Huon Penin., 10–28. II. 1959, W. W. Brandt. W. NEW GUINEA: Holotype ♀ (BMNH), Humboldt Bay; 1 ♂, 7 ♀♀ & nymphal tubes (TCM), Noordwijk, Hollandia, 15. VIII. 1959 & X. 1960, R. T. Simon Thomas; 1 ♀ (CAS), Maffin Bay, 1. I. 1945, E. S. Ross; 1 ♀ (USNM), Hollandia, V. 1945, B. Malkin; 1 ♀ (USNM), "New Guinea", I. 1945, R. S. Roberts.

HOST PLANT: *Pipturus* sp. (Urticaceae).

This common Machaerotine bug probably occurs throughout the lowland of New Guinea with the possible exception of Vogelkop Penin. and the southern coastal area. The length of its scutellum proper varies from 27–35 (♂) and 33–38 units (♀), depth in profile 17–21 (♂) and 20–23 (♀) and length of scutellar process from 33–46 (♂) and 44–52 (♀). An analysis of the measurements did not show any degree of geographic significance.

The following specimens are left unnamed:

1 ♀ (BISHOP), Kulima, 1400 m, Baliem Valley, W. New Guinea, 19–22. II. 1960, Maa; 1 ♀ (BISHOP), Kutsime, W of Swart Valley, 1500 m, W. New Guinea, 14. XI. 1958, Gressitt. Near *M. ampliata*, but lateral pronotal ampliation weaker and scutellum in profile shallower.

1 ♀ (BISHOP), Gabuni Vill., Saidor, Finisterre Range, NE New Guinea, 24–30. VI. 1958, W. W. Brandt. Near *M. humboldti* but scutellar sulcus shorter, area below sulcus distinctly depressed longitudinally, and lateral stripe of scutellum weakly curved, not uniform in breadth.

1 ♂ (AM), Broken Hill, New South Wales, Australia, 1924, F. W. Shepard. Near *M. notoceras*. Almost certainly wrongly labelled.

1 ♀ (BMNH), Dili, Timor, 1903, W. Doherty. Probably a n. sp., but scutellum damaged, head much longer than in *rastrata*.

Machaerota woodlarki Maa, n. sp. Figs. 15L, 20 M–P, 26P.

Male: Similar to *M. humboldti*, differing in following points: Postero-inferior margin of scutellum only slightly tinted with yellow at lower part, distinctly darker than lateral stripe; lateral stripe posteriorly much narrower; tegminal veins slightly paler. Side piece of vertex more convex; lateral frontal suture very shallow; supra-antennal triangle not abruptly elevated. Pronotum nearly 1.5× as broad as head (39 : 23), anterolateral margin distinctly incurved near callus, far more narrowly compressed than posterolateral margin. Scutellum less upraised; scutellar sulcus about 3/5 as long as scutellum, narrowed caudad; lateral surface slightly depressed. Sub-anal lobe of pygofer strongly produced. Body length 5.5 mm, tegmen 4.0.

WOODLARK I.: Holotype ♂ (BISHOP 3228), Kulumadau Hill, Murua, 16–22. IV. 1957, W. W. Brandt.

The discovery of this species marks the easternmost distribution of the family.

*__Machaerota siebersi__ (E. Schmidt), n. comb.

Eumachaerota siebersi E. Schmt. 1928: 111, ♂. Type, Kei Is. (no further details) (WSW).

__Machaerota moluccana__ Kirkaldy Figs. 19C, 28F.

Machaerota moluccana Kirk. 1913: 10.

M. insignis Lallemand 1927: 99, ♀. **New Synonymy.**

Female: Dark chestnut brown, more or less paler on lateral transverse lines of post-

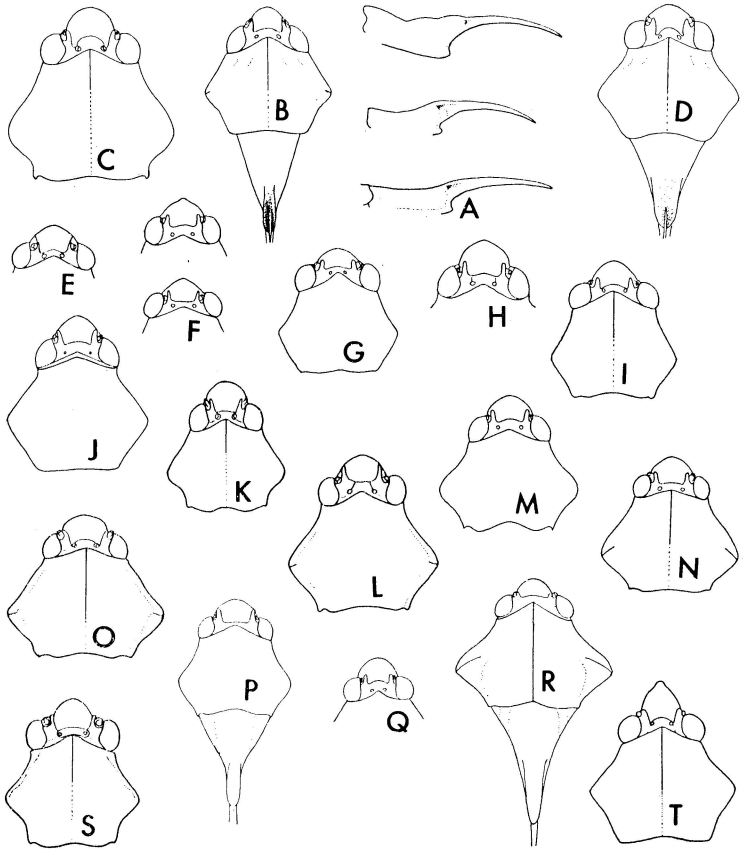

Fig. 19. *Machaerota* spp., scutellum, side view (A) and head and neighboring area, dorsal view (B-T), drown to same scale. A-B, *rastrata* Wk. (A showing variation of scutellum in profile); C, *moluccana* Kirk., holotype ♀; D, *pugionata* Stål, ♀; E, *mindanaensis* Bkr., ♀ syntype; F, *philippinensis* Bkr., ♀ syntypes, the lower one is abnormal; G, *longiscutata* Maa, ♀ paratype; H, *convexa* Maa, holotype ♀; I, *confusa* Maa, holotype ♀; J, *fusca* Bkr., ♀ syntype; K, *signatipennis* Maa, allotype ♀; L, *latior* Maa, allotype ♀; M, *luzonensis* E. Schmt., ♀ from Sumatra; N, *subnasuta* Maa, neallotype ♂; O, *assamensis* Dist., ♀; P, *elegans* Maa, holotype ♂; Q, *formosana* Kato, holotype ♂; R, *flavolineata* Dist., ♂ from Vietnam; S, *spangbergii* Sign., ♀; T, *punctatonervosa* Sign., holotype ♀.

clypeus, on posterolateral margin of pronotum and on scutellum; calli black. Posteroinferior margin (lower 2/3) and lateral stripe of scutellum and basidorsal carina (basal 1/2) of scutellar process ivory white; lateral stripe straight along upper margin, only about 3× as long as broad, 2/7 as long as ventro-lateral margin of scutellum. Scutellar process brownish yellow. Tegmen evenly stained with pale yellowish, veins brownish yellow, sided by small indistinct brownish setigerous punctures; costal vein and anal margin, both except at extreme apex, brown. Venter of metathorax posteriorly yellow. Abdominal tergites and sternites medially broadly yellow, laterally brown to black. Fore and mid legs brownish yellow, hind leg brownish piceous.

Head distinctly produced forwards. Postclypeus strongly convex. Tylus slightly shorter than broad, weakly convex, gently descending laterad, anteriorly with a small indistinct tumescence, posteriorly not depressed. Side piece of vertex almost plane, slightly slanting laterad; tentorial pit very deep; occipital margin shallowly sinuate at middle and not reflexed except behind each tentorial pit. Ocellar area coarsely wrinkled. Pronotum strongly reticulate-punctate; median carina complete, fairly strong at anterior 1/2; calli linear, oblique; anterolateral margin much longer than posterolateral margin, carinated at anterior 1/3 and narrowly reflexed at remaining 2/3; lateral angle broadly rounded, lacking oblique ental carina; posterolateral angle acuminate, strongly produced ventrocaudad; posterior margin angularly incised at middle (when viewed dorso-caudally). Scutellum very strongly compressed bilaterally, similarly sculptured as pronotum; median carina weak, extending from base and entering anterior 1/3 of sulcus; sulcus shallow, only about 1/2 as broad as interocellar distance, shallowly punctate and about 2/3 as long as scutellum; lateral surface discally depressed, and immediately before scutellar process is an extensive tumescence which is visible in dorsal aspect. Scutellar process also strongly compressed bilaterally at base, apex strongly arched and well surpassing level of apices of closed tegmina; basilateral depression longly oboval; basidorsal carina scarcely entering sulcus. Tegmen wrinkled at apical cells; claval vein simple (? constant); discoidal cell joining radius by an oblique crossvein. Anal segment in profile distinctly upcurved at extreme apex, its median length smaller than 1/2 that of anal style (5 : 6.5). Relative breadths of head, pronotum and scutellum 27 : 45 : 21. Body length 8 mm, to apex of scutellar process 9.

MATERIAL EXAMINED: AMBOINA: Holotype ♀ (HSPA 385), Ambon, XI. 1907. CERAM: 1 ♀ (BMNH, holotype of *insignis*), E. Stresemann.

This appears to be a very distinct species and is chiefly characterized by its long head, highly arched and strongly compressed scutellum, short pale lateral scutellar stripes and long and strongly decurved scutellar process. The type of *insignis* differs from the above description in certain respects (but no direct comparison was made with the type of *moluccana*): Median pronotal carina distinctly paler than neighboring areas. Basidorsal carina of scutellar process not pale marked; lateral stripe 2/5 as long as scutellum. Tegmen tinted with brownish at apical 1/3, and with a narrow brownish black fascia superposing apical ambient vein and extending to extreme apical margin of corium (not incl. appendix); veins R_1 and Rs and crossveins inbetween yellowish brown, with brownish black granules; other veins yellow, with very few brown granules on M+Cu stem and basal part of Cu. Venter of thorax and of abdomen largely ivory white; venter of fore and mid femora and dorsum of hind tibia largely yellow. Tylus flattened, anteriorly weakly foveate. Pronotum without roundish punctures; rims of reticulation much narrower than meshes, and transverse

rims much stronger than longitudinal ones. Scutellum more strongly sculptured than pronotum, with deep, roundish punctures; sulcus almost 5/6 as long as scutellum; apical tumescence on lateral surface poorly developed. Apparently these differences merely represent individual variation and the type of *insignis* has undergone certain postmortem color changes.

Machaerota foveata (Maa), n. comb.

Eumachaerota foveata Maa 1949: 12, fig. 1, ♀. Type, S. Celebes: Rantepao (Nanggala, 900 m) (LDN).

Machaerota rastrata (Walker) Figs. 19 A–B, 20 A–E, 28G.

Narnia rastrata Wk. 1868: 193.
Machaerota punctatonervosa, Melichar 1914: 116 (misinterpretation; Java).
Machaerota lieftincki Maa 1949: 15, fig. 3, ♀. **New Synonymy.**
M. carinata Lallemand 1951: 83. **New Synonymy.**

Male: Black, more or less tinted with brown. Postclypeus with 7–9 yellow haired transverse lines at each side; gena proper yellow; anteclypeus sometimes brown or brownish yellow; tylus, side piece of vertex and scutellar sulcus with obscure brownish yellow markings. Scutellum lacking distinct lateral stripe, ivory white on lower part of posteroinferior margin and base of apical process; apical process yellow to brownish yellow, with numerous minute brown spots. Tegmen almost colorless; extreme base brownish black, sometimes with a short yellow stripe along base of claval vein; apical 1/2 with small, brown granules on veins; veins yellowish; basal 1/3 of costal and almost entire anal margins brownish black. Legs brownish black, fore femur with yellow stripes, hind tibia largely yellow. Abdominal tergites 2–3 (entirely) and 4–8 (medially) yellow.

Postclypeus moderately convex, finely, densely punctate; keel feeble; transverse lines at side very narrow. Crown weakly rugose-punctate. Tylus plane, anteriorly slightly descending; side piece of vertex almost plane; tentorial pit transverse, deep, short; occipital margin weakly curved and reflexed; ocellar area descending laterad. Pronotum fairly convex, reticulate-punctate; median carina scarcely recognizable even at anterior 1/2; calli shallow, oblique, oval; anterolateral margin slightly shorter than posterolateral margin; posterior 2/3 of the former and entirety of the latter carinated, scarcely reflexed; lateral and posterolateral angles broadly rounded; oblique ental carina not definable. Basal sclerites of closed tegmen, lying distinctly outside of lateral pronotal angle. Scutellum very shallow in profile, slightly depressed before sulcus, which is wide, shallow and only about 1/3–2/5 as long as scutellum; area below sulcus (lateral surface) scarcely depressed. Scutellar process short, weakly arched, with very long basidorsal carina and basilateral depression. Tegmen with forked (? constantly so) claval vein, lacking extra crossvein between discoidal cell and costal margin. Relative breadths of head, pronotum and scutellum 19 : 27 : 14. Body length (to apex of scutellar process or closed tegmina) 4.5 mm, tegmen 3.4.

Female: Much paler. Stramineous. Postclypeus brownish black, at each side with about 10 (incl. 4 on tylus) transverse yellow lines, upper ones of which broader than interspacing black lines, the lower ones very narrow, almost only indicated by lines of dense hairs. Pronotal and scutellar punctures and calli dark brown. Lateral stripe of scutellum straight, whitish 1.5–2.5× as long as wide. Scutellar process yellowish. Tegmen narrowly

brown along costal (basal 1/3) and anal (entirely) margins, whitish along basal 1/3 of claval vein; extreme base and granules correspondingly paler than in ♂. Venter of thorax largely brown to brownish black. All femora striped with yellow. Abdominal tergites 2–3 and 7–8 largely yellow, 4–6 & 9 largely black. Structure similar to ♂, but median carinae on postclypeus (upper 1/2) and pronotum (anterior 1/2) fairly distinct. Relative breadths of head, pronotum and scutellum 21 : 30.5 : 15. Body length 5.2–5.8 mm, tegmen 4.0–4.7.

HOST PLANT: *Hibiscus rosa-sinensis* Linn. (Malvaceae).

MATERIAL EXAMINED: FLORES: Holotype ♀ (BMNH); 2 ♂♂, 1 ♀ (BMNH) & 1 ♀ (LDN), Rana Mese, Lerang, 1300 m, 17. XI. 1949, Bühler & Sutton; 1 ♂ (LDN), much damaged, Wolosambi, 800 m, V. 1950, H. C. Vos. E. SUMBA: 1 ♂ (LDN), Laiwuhi, Melolo, 6. VI. 1949, Bühler & Sutton; 2 ♂♂, 2 ♀♀ (BMNH) & 1 ♂, 1 ♀ (LDN), Rende Wai, Prai Jawang, 14–15. VI. 1949, Bühler & Sutton. JAVA: 1 ♀ (BMNH), "Java"; 1 ♂,

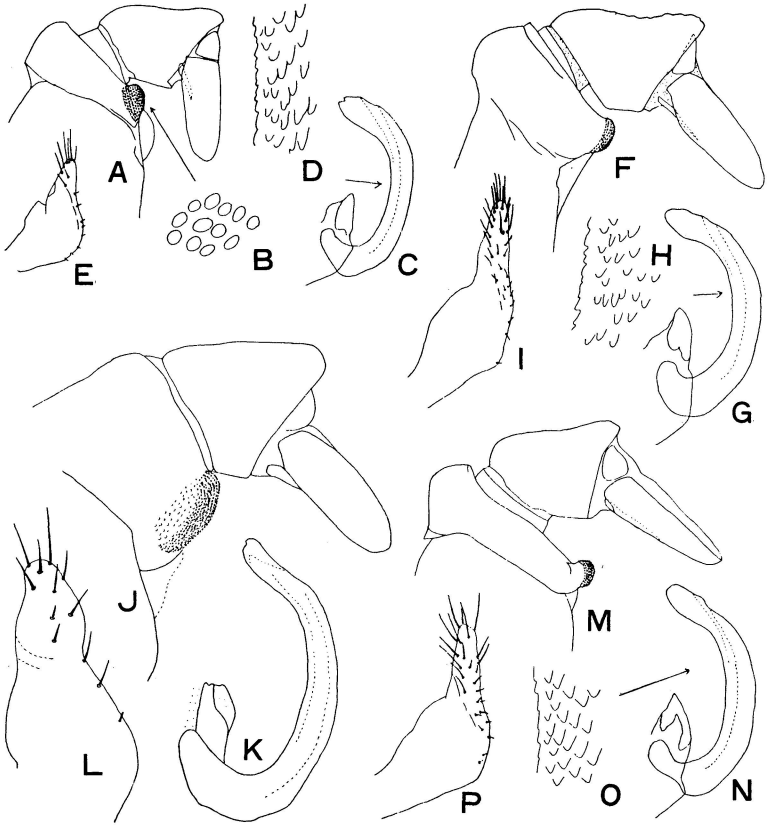

Fig. 20. *Machaerota* spp., ♂ genitalia, upper part, side view (A, F, J, M); scabrous area of pygofer, sculpture (B); aedeagus and periandrium (C, G, K, N); aedeagal scales (D, H, O); paramere, side view (E, I, L, P). A–E, *rastrata* Wk. from Flores; F–I, *humboldti* Lall. from Hollandia; J–L, *nigrifrons* E. Schmt., holotype; M–P, *woodlarki* Maa, holotype. All except B, D, H and O drawn at same magnification.

1 ♀ (WN), Batavia, Novara Exped.; 1 ♂ (BRN), Nongkodjadjar, I. 1911, E. Jacobson; 1 ♀ (BRN), Batavia, XI. 1908. Last 2 specimens determined L. Melichar as *M. punctato-nervosa* Sign.; 3 ♂♂, 4 ♀♀ (WSW), Baluron, Beokol ad Banjuwangi, 17. V. 1959, B. Pisarski & J. Proszynski. SUMATRA: 1 ♀ (BMNH, holotype of *M. carina'a* Lall.), Senkoelen, Marang-Liwa, 1898, coll. Noualhier.

All the material collected by Bühler and Sutton was determined as this species by H. C. Blöte. The specific name *rastrata* (derived from *rastrum*, hoe, rake) has been often wrongly spelled as *rostrata*. The year of publication has been cited as 1860 in Buckton's monograph and Funkhouser's catalogue of Membracidae and as 1870 in Metcalf's bibliography of Homoptera Auchenorrhyncha. Funkhouser even gave Brazil as its type locality. Goding (1935: 335) listed the species from Celebes, but his determination is to be verified.

Two of the 4 ♂♂ from Java are similarly colored as the ♀ and thus much paler than the ♂ from Flores. As shown in fig. 19 A, the postero-inferior margin of scutellum in specimens from Sumba, ♂♀, is shorter than profile depth of scutellar process at base. The postclypeal keel is usually distinct, but sometimes hardly defined in this species. The material at hand is quite limited, but leaves no doubt that *rastrata* and *lieftincki* (type from Java: Buitenzorg and Bandung, in Leiden Mus.) and *carinata* are conspecific. The crossing of the Wallace line and spreading to Java and Sumatra of this species may probably be attributed to recent introduction.

Machaerota nigrifrons (E. Schmidt), n. comb. Fig. 20 J–L.

Pachymachaerota nigrifrons E. Schmt. 1907: 197, fig. 8, ♂.

Male: Head in dorsal view fairly short and anteriorly broadly rounded at middle. Postclypeus evenly convex, with some fine indistinct punctures, its lateral punctate lines ill defined; anteclypeus transversely striate, weakly keeled. Tylus microsculptured, descending forward, slightly flattened, hardly raised along median line; side piece of vertex scarcely depressed, about 1/2 as wide as tylus; ocellar area longer than tylus, transversely striate, strongly descending laterad; ocelli much closer to occipital margin than to tylus, interocellar distance subequal to length of ocellar area; tentorial pit shallow; occipital margin angulately incised at middle, weakly reflexed. Pronotum strongly convex, sparsely haired; transverse rims of reticulae stronger and closer to one another than longitudinal ones; anterior 1/2 of median carina weak, other 1/2 ill defined; calli shallow, roundish; anterolateral margin nearly straight, sharply carinate, hardly explanate, distinctly longer than posterolateral margin; no oblique ental carina; posterolateral margin slightly curved, also hardly explanate; posterior margin shallowly sinuate; lateral angle not reaching level of basal sclerites of tegmen at repose, and as in posterolateral angle, very broadly rounded. Scutellum anteriorly weakly convex, posteriorly strongly compressed bilaterally and with much finer sculpture than at anterior part; lateral stripe not definable (? constant); anterior 1/2 of median carina weak and entering sulcus, other 1/2 not recognizable; sulcus not depressed, gradually narrowed apicad, about 2/3 as long as scutellum proper, its rim not explanate; scutellum in profile excessively highly arched, deepest near midpoint; postero-inferior margin about as long as basal depth of posterior process; process straight in profile, slightly shorter than scutellum proper. Tegmen smooth except area beyond apical ambient vein; veins lacking distinct dark spots; relative length and width of discoidal cell 17 : 10; claval vein unbranched (? constant). Relative widths of head, pronotum and scutellum 24 : 37 :

19. Genitalia as figured. Other characters as in original description.

MATERIAL EXAMINED: SUMBA: Holotype ♂ (WSW), no further details. The holotype is in fairly good condition but somewhat "greasy" and its pale markings probably have been obscured.

This remarkable species bears some superficial similarities to *M. subnasuta* Maa of Malaysia and *M. exaggerata* Maa of Indochina. Its long ocellar area, flat scutellar sulcus and short broad discoidal cell are unique for the genus; the broadened side piece of vertex and shortened anterolateral pronotal margin are also noteworthy. *M. pugionata* Stål and *M. rastrata* (Wk.) are its closest relatives but the 3 species can be easily separated by the profile outline of the scutellum, the length of ocellar area and the width of scutellar sulcus.

Machaerota pugionata Stål Figs. 19D, 21 A, J, Q, Y, 27A.

Machaerota pugionata Stål 1865: 154, ♀.
M. gupionata (err. for *pugionata*), Signoret 1879: 49, ♂ (redescr.; Australia).
Pachymachaerota pugionata, E. Schmidt 1907: 198, ♀ (redescr.).
P. signoreti E. Schmt. 1907: 199, ♂ (n. name for *pugionata* Sign. not Stål). **New Synonymy.**

MATERIAL EXAMINED: NW AUSTRALIA: Holo- and paratype ♂♂ (STK), Austral. boreal., G. Thorey; 7 ♂♂, 5 ♀♀ (STK), Kimberley Distr., III. 1911, E. Mjöberg; 1 ♂ (STK), same data, but II. 1911; 1 ♂, 1 ♀ (USNM), Kings Sound; 1 ♂, 2 ♀♀ (USNM), Endeavour R. N. TERRITORY: 1 ♂, 2 ♀♀ (SAM), Daly R., H. Wesselman.

According to Dr. M. Beier of Vienna Museum, the type of *signoreti* E. Schmt., i. e., the specimen determined and redescribed by Signoret (*l. c.*) as *pugionata* Stål (misprinted as *gupionata*) is lost and no longer traceable. E. Schmidt (*l. c.*), having only 1 ♀ paratype of *pugionata* and without examining the Signoret collection, hastily gave a new name *signoreti* on the assumption that Signoret had misidentified the species. The supposed distinguishing characters are: "Dritte Langsäder der Flugel hinter der Querader gegabelt (nicht gegabelt in *pugionata*); im Clavus ein Langsnerv, der Quernerv in der Clavusaussenzelle fehlt (befindet ein Querader in *pugionata*); die Hinterschienen gelb, die Oberseite und das Basalende sind schwarz gebarbt (Signoret wrote: "Tibias posterieurs jaunes, avec le sommet et la base noirs") (orangerot mit braunem Basal- und schwarzem Distalende in *pugionata*); Lange ♂ 4 mm (♀ 5 mm in *pugionata*)."

An examination of the material at hand revealed that all these characters fell within the ordinary range of variations of this species and *signoreti* is nothing but an unnecessary new name. Longitudinal vein 3 of the wing is forked at both sides in the holotype, but not in all other specimens examined. The claval vein of tegmen is usually forked but in the holo- and paratypes and one of the ♂♂ from Kimberley, it is simple at one side. The hind tibia varies in color. The body length "4 mm", as in cases of other Signoret species, does not include closed tegmina.

Both the holo- and paratypes are in fairly good condition. The color pattern however is noticeably darker than in fresh material from Kimberley: Venter of thorax almost entirely dark brown; abdominal segments 2–5, pygofer and genital plate largely brownish black; legs blackish brown, knees of 2 fore pairs and tibia (excl. both ends) of hind pair yellow. In fresh specimens, these parts are largely reddish yellow, only the apices of hind

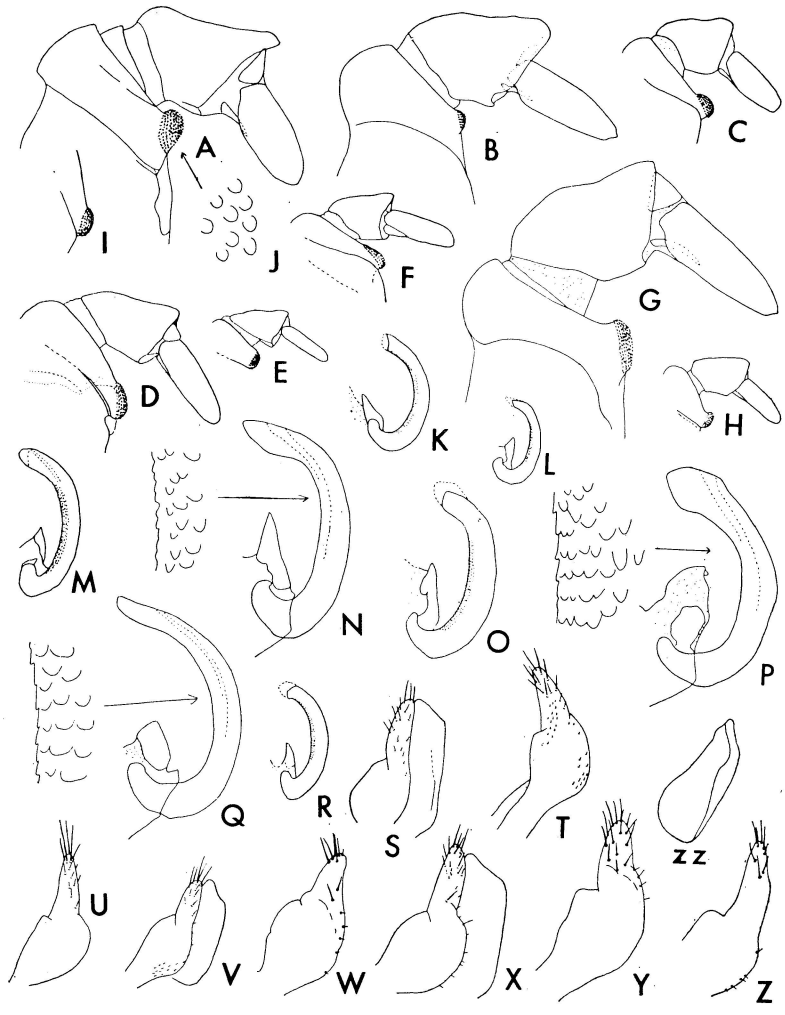

Fig. 21. *Machaerota* spp.: *pugionata* Stål (A, J, Q, Y), *palawana* Maa, holotype (D, M, S), *mindanaensis* Bkr., paratype (C, O, X), *philippinensis* Bkr., paratype (F, I, T), *longiscutata* Maa, paratype (G, N, Z), *ensifera* Burm. from Luzon (B, P, W), *notoceras* E. Schmt. from Penang (H, L, U, ZZ), *signatipennis* Maa, paratype (E, R, V). ♂ genitalia, upper part, side view (A–H); scabrous area of pygofer (I); same, sculpture (J); aedeagus and periandrium (K–R, the arrow-heads in N, P and Q indicating aedeagal scales); paramere, side view (S–Z, the basal plate is shown in S, V, and X); basal plate (ZZ). Figures drawn at different magnifications.

leg spines, lateral margins of tergites 2–3 and abdominal apex are dark brown.

The scutellum in this species is convex near base. Behind the convexity, or from its summit, a fine median carina starts and runs through the scutellar sulcus. The latter is only 2/5 as long as scutellum, about 2× as long as broad and slightly narrowed behind. The lateral surface of scutellum is almost plane.

KEY TO MACHAEROTA SPECIES OF PHILIPPINE SUBREGION

(For *M. luzonensis*, see under enumeration of Malaysian species)

1. Discoidal cell of tegmen as long as breadth of the latter; length of ocellar area subequal to interocellar distance; ocellus much closer to occipital margin than to tylus; scutellum only 1/4 longer than its pale lateral stripe ..... **fusca**
   Discoidal cell distinctly shorter than breadth of tegmen; length of ocellar area about 1/2 of interocellar distance; ocellus equidistant from occipital margin and tylus; scutellum nearly 2× as long as its pale lateral stripe if present..... 2
2 (1). Profile depth of scutellum exceptionally small, hardly greater than that of eye; scutellum lacking lateral stripe and about 3× as long as its sulcus; crown subangularly produced forward; body (♂) very deep castaneous, 5 mm long ..... **attenuata**
   Profile depth of scutellum much greater than that of eye; scutellum with lateral stripe and usually much less than 3× as long as its sulcus..... 3
3 (2). Postero-inferior margin of scutellum at least 1/2 longer than profile depth of scutellar process at base; posterolateral angle of pronotum acute or subacute, often projecting out; body color almost always castaneous; claval vein of tegmen usually forked 4
   Postero-inferior margin of scutellum subequal to profile depth of scutellar process at base; posterolateral angle of pronotum broadly rounded, never projecting out; body always mainly testaceous; claval vein usually simple..... 9
4 (3). Superior margin of scutellum in profile almost horizontal at basal 1/3 or 2/5, thence suddenly strongly arched, leaving a distinct "neck" region; upper part of postclypeus with broad, fairly distinct keel; body castaneous..... 5
   Superior margin of scutellum in profile gently, evenly curved, lacking "neck" region; postclypeus lacking any trace of a keel 7
5 (4). Lateral stripe of scutellum nearly straight, apically far from meeting rim of sulcus; upper part of postclypeus distinctly keeled; apical cells of tegmen irregularly wrinkled; tylus hardly shorter than broad.....**palawana**
   Lateral stripe of scutellum strongly upcurved and apically meeting rim of sulcus... 6
6 (5). Scutellum in profile with neck region shorter than deep, greatest depth subequal to length along lateroventral margin, lateral stripe ending well before middle of scutellum; tylus in ♀ much longer than broad; postclypeus prominently keeled ..... **philippinensis**
   Scutellum in profile with neck region much longer than depth, greatest depth much smaller than length along lateroventral margin, lateral stripe ending at middle of scutellum; tylus in both sexes shorter than broad; postclypeus comparatively weakly keeled ..... **mindanaensis**
7 (4). Superior margin of scutellum in profile convexly curved; tylus almost as long as broad; lateral stripe of scutellum not meeting rim of sulcus; body (♀) testaceous, 7.8 mm long ..... **convexa**
   Superior margin of scutellum in profile weakly, concavely curved; tylus only about 1/2 as long as broad; lateral stripe of scutellum apically meeting rim of sulcus; body (♀) not more than 6.5 mm long 8
8 (7). Posterolateral angle of pronotum acute, postero-inferior angle of scutellum tubercle-

like, both distinctly protruding caudad; interocellar distance hardly greater than ocello-ocular distance; body (♂) dark castaneous ..... **longiscutata**

Posterolateral angle of pronotum subacute, postero-inferior angle of scutellum not tubercle-like, both not protruding caudad; interocellar distance nearly 2× ocello-ocular distance; body (♀) testaceous ..... **confusa**

9 (3). Pronotum yellow with 5 brown or brownish stripes; head longer, with anterior margin of crown distinctly unparallel to posterior margin of tylus; posterior margin of ♂ pygofer almost straight, not lobed; lateral stripe of scutellum largely or entirely straight and horizontal, not meeting rim of sulcus..... **ensifera**

Pronotum unicolored without darker stripes except calli; head short, with anterior margin of crown subparallel to posterior margin of tylus; posterior margin of ♂ pygofer distinctly lobed near upper and lower ends; lateral stripe of scutellum oblique, meeting rim of sulcus ..... **virescens**

Machaerota palawana Maa, n. sp. Fig. 21 D, M, S.

Male: Similar to ♂ of *M. mindanaensis*, differing in following points: Color paler; yellow marking along posterolateral and particularly anterolateral margins of pronotum narrow and inconspicuous; scutellum reddish brown, distinctly paler than pronotum, its lateral stripe nearly straight, about 1/3 as long as scutellum, apically not meeting rim of sulcus, postero-inferior margin entirely ivory yellow; scutellar process including its basidorsal carina yellowish brown, lacking brown spots. On the other hand, postclypeus darker, black, its yellow transverse lines at sides quite narrow and obscured; brownish granules superposing tegminal veins slightly more conspicuous.

Body rather densely haired. Antero-superior corner of head in profile subangular, not broadly rounded. Keel of postclypeus fairly strong. Tylus hardly shorter than broad. Pronotum with short oblique ental carina at lateral angle. Scutellum anteriorly lacking median carina; sulcus moderately deep, about as broad as interocellar distance, about 2/3 as long as scutellum; lateral surface depressed. Tegmen wrinkled at apical cells; discoidal cell partly wrinkled, about 2× as long as broad (14: 6). Relative breadths of head, pronotum and scutellum 21 : 33 : 17. Body length 5.1 mm, to apex of scutellar process 6.0.

PALAWAN: Holotype ♂ (BRN), Bacuit, XII. 1913, G. Boettcher; 1 ♀ (USNM), Puerto Princesa, C. F. Baker.

The unique ♂ specimen bears L. Melichar's manuscript name "*M. malaya* n. sp." Since it is not quite appropriate, the name is here changed to *palawana*. The ♀ from Puerto Princesa was originally included under *philippinensis* in Baker's collection. Its scutellum is damaged and thus not included in the type series. The species is allied to both *M. mindanaensis* and *M. philippinensis* and is mainly characterized by the color pattern and the shape of head. The ♂ genitalia of these 3 species, and of *M. longiscutata* as well, are rather similar, and I would not be surprised if further collecting and dissecting should prove that they actually represent geographic races of 1 species.

Machaerota mindanaensis (Baker) Figs. 19E, 21 C, O, X, 27B.

Conmachaerota mindanaensis Bkr. 1927: 534, pl. 1 (4-6), ♀♂.
Machaerota mindanaensis, Maa 1956: 234 (key).

MATERIAL EXAMINED: MINDANAO: 4 ♂♂, 1 ♀ (USNM, syntypes), Iligan; 3 ♀♀ (STK), Ins. Philipp. (no further details); 1 ♂ (BISHOP), Agusan, Los Arcos, 19. IX. 1959, C. M. Yoshimoto; 1 ♀ (USNM), Dapitan, C. F. Baker; 1 ♀ (USNM, syntype), Surigao. LEYTE: 1 ♀ (CAS), Tacloban, XII. 1944, E. S. Ross. BILIRAN: 1 ♀ (USNM), C. F. Baker.

The ♀ specimens before me well fit Baker's description and illustration, although the size (length to apex of scutellar apex 7 mm, not 7.5) is not larger but smaller than *philippinensis* and the scutellar sulcus narrower instead of broader than that of the latter species. Baker stated that there were 5 pale yellow oblique lines on sides of "frons", but actually no *Machaerota* species have so few such lines. The "basal article of hind tarsus except extreme base and apex" was said to be pale yellow. This undoubtedly refers to the hind tibia instead.

The type series of this species is comprised of 1 ♀ (with Baker's red name label) from Surigao and 4 ♂♂, 1 ♀ from Iligan. The Surigao ♀ is accordingly selected as lecto-holotype, and one of the Iligan ♂♂, as lecto-allotype. In the lecto-holotype, the head is short, postclypeus keeled and scutellum highly arched as figured and described by Baker. The ♀ from Dapitan, determined by P. W. Oman as *M. philippinensis* var., is abnormal in having a long acute head as in typical *philippinensis* but its scutellum is typical for *mindanaensis*.

Machaerota philippinensis Baker Figs. 19F, 21 F, I, T, 27C.

Machaerota philippinensis Bkr. 1919: 70, pls. 1 (2, 3, 10) & 2 (1), ♀♂.—Maa 1956: 234 & 236, pl. 2 (11) (♂ abd. apex; Luzon records). Wrongly spelled by Lallemand (1942: 428) as *philippensis*.

Conmachaerota philippinensis, Bkr. 1927: 534 (key).

MATERIAL EXAMINED: LUZON: 1♂, 6♀♀ (USNM, syntypes), Mt. Maquiling; 3♀♀ (WN), Manila, Raszlag coll.; 1 ♀ (HSPA), Los Baños, III–VI. 1926, C. E. Pemberton; 2 ♀♀ (STK), Ins. Philipp. (no further details), C. G. Semper; 1 ♂ (USNM), Manila, W. A. Stanton; 2 ♂♂, 2♀♀ (USNM, syntypes), Los Baños. MINDORO: 1 ♀ (CAS), San José, II. 1945, F. E. Skinner.

This outstanding species can be easily distinguished from other Philippine machaerotid bugs by the highly arched scutellum and long subangulately produced head. The latter character however shows some definite sexual dimorphism. The head in ♂ is noticeably shorter than in ♀, and Baker's figure is probably drawn from a ♂. The median pronotal carina is rather narrow and high at anterior 2/3, but hardly definable at the other 1/3; lateral pronotal angle narrowly rounded, extending to level of basal sclerites of closed tegmen, occasionally slightly surpassing the latter, its oblique ental carina very short, weak or even absent; posterolateral pronotal angle subacute, not spine-like; anterolateral margin nearly straight, much longer than posterolateral margin; median scutellar carina poorly defined, extending from base of scutellum and running through sulcus; sulcus deep, 2/3 as long as scutellum, as broad as or slightly broader than interocellar distance; tegmen irregularly wrinkled at discoidal and apical cells, relative length and breadth of former 17 : 7.

In the type series of this species, there are 3 ♂♂ and 9 ♀♀, 7 from Maquiling, and Los Baños. The one bearing a red name label is a ♀ with a long acute head from Maquiling. It is here selected as the lecto-holotype. The 2 Los Baños ♂♂ are with

similarly shaped head, and one of them is selected as the lecto-allotype (the other ♂ is much smaller and its scutellum lower, and may not belong here). Four of the ♀♀ from Maquiling, and 1 from Los Baños are with short blunt heads, the remainder are identical with the lecto-holotype.

Haupt (1953 : 45) listed this species from "Australian Region." This is certainly untrue unless he considered the Philippines as a part of that Region.

Machaerota longiscutata Maa, n. sp. Figs. 19G, 22 G, N, Z, 27D.

Male: Color pattern similar to ♂ of *M. mindanaensis*. Supra-antennal triangle bright yellow; lateral pronotal margin narrowly yellow except at lateral angle; lateral stripe of scutellum basally very broad, apically extending beyond midpoint of scutellum; scutellar process castaneous; tegminal veins sordid yellow, distinctly darker than ground color.

Head shorter than in *mindanaensis*, anteriorly broadly rounded both in dorsal and lateral aspects; postclypeus evenly convex along median line, lacking distinct keel; tylus more convex and less pubescent than in *mindanaensis*; side piece of vertex proportionally longer than in the latter species. Pronotum proportionally long and narrow; lateral angle rounded, lacking oblique ental carina; posterolateral angle acute; anterolateral margin distinctly incurved (in *mindanaensis* and *philippinensis*, nearly straight); median carina except its posterior 1/3 or 1/5 narrow and high; areas at sides of anterior 1/2 of median carina strongly descending ventro-laterad. Scutellum and its process less highly arched but much longer than those in the 2 latter species; basidorsal area enclosed by lateral stripes much longer than broad; sulcus deep, 3/5 as long as scutellum, as broad as interocellar distance; superior margin in profile rather evenly concavely curved, hence not forming distinct neck region; basidorsal carina of scutellar process hardly entering sulcus; rim of sulcus hardly explanate. Tegmen smooth on discoidal and apical cells; relative length and breadth of former 18 : 6 (in ♂ *mindanaensis*, 14 : 7). Body length 5.6 mm, to apex of scutellar process 6.6–6.9; tegmen 4.7 mm long.

MINDANAO: Holotype ♂ (CM), Mt. Pantod, 800 m, Santa Cruz, Davao Prov., S. Mindanao, on leaves of original forest, 12. XII. 1946. M. Celestino. Paratypes 1♂ (BISHOP), same data; 1♂ (BISHOP) Zamboanga del Sur, 11 km NW of Milbuk, 390 m, 5. VIII. 1958, H. E. Milliron.

This species is a close ally of *philippinensis* and *mindanaensis* and differs from them in having a shorter head; non-keeled postclypeus, lower scutellum, longer basidorsal area and lateral stripes of scutellum (for which the name *longiscutata* is suggested), smooth tegmen and longer and narrower discoidal cell.

Machaerota convexa Maa, n. sp. Figs. 19H, 28H.

Female: Almost uniformly testaceous; rostral apex (venter) and tibial and tarsal spines of hind leg black; pronotum with a pair of inconspicuous yellow broad submedian stripes which are slightly divergent caudad; lateral stripe of scutellum 2/5 as long as latter, apically slightly curved, far from meeting rim of sulcus; rim of sulcus with a few indistinct brownish spots, anteriorly yellowish; postero-inferior margin of scutellum and basal spot of scutellar process also yellowish. Tegmen yellowish, lacking any brown or blackish markings; veins yellow. Ovipositor-sheath and lateral margin of abdominal segments

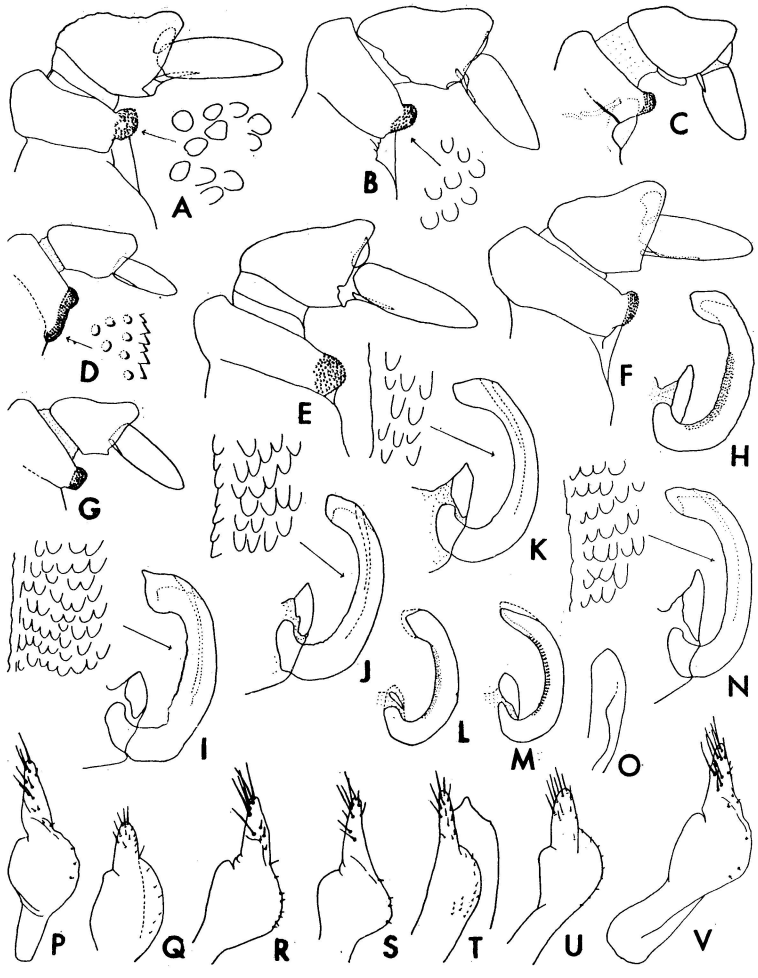

Fig. 22. *Machaerota* spp.: *discreta* Dist. from Thailand (A, I, R), *latior* Maa, paratype (G, L, U), *luzonensis* E. Schmt. from Sumatra (B, K, P), *subnasuta* Maa, neallotype (D, M, O, Q), *elegans* Maa, holotype (E, N, V), *coomani* Lall. from Hainan (F, J, S), *brunnipes* E. Schmt. from Thailand (C, H, T). ♂ genitalia, upper part, side view (A–G, sculpture of scabrous area of pygofer more enlarged and indicated by arrow-heads in A, B, and D); aedeagus and periandrium (H–N, aedeagal scales more enlarged and indicated by arrow-heads in I, J, K, and N); basal plate (O); paramere, side view (P–V, basal plate partly shown in T). Figures drawn at different magnifications.

brownish.

Head moderately long, anteriorly subangulate in lateral aspect; postclypeus evenly convex along median line, lacking any trace of keel; tylus gently descending laterad and caudad, nearly as long as broad; side piece of vertex anteriorly slightly raised; ocellar area strongly descending laterad; occipital margin weakly sinuate at middle, not reflexed. Pro-

notum proportionally shorter and broader than but similarly sculptured as in *M. philippinensis*; lateral angle broadly rounded, extending slightly beyond level of basal sclerites of closed tegmen, with a short oblique ental carina; posterolateral angle acute; anterolateral margin almost straight; median carina prominent, very weak at both ends; areas at sides of anterior 1/2 of median carina weakly descending ventro-laterad; posterolateral submarginal area rather broadly depressed. Scutellum highly arched posteriorly; superior margin in profile convexly curved; sulcus shallow, 3/5 as long as scutellum, broader than interocellar distance, basidorsal carina of scutellar process hardly entering sulcus. Tegmen smooth at discoidal and apical cells; relative length and breadth of former 25 : 11. Body length 7.8 mm long; tegmen 6.4 mm long, 2.1 broad.

LUZON: Holotype ♀ (MCZ 30337), Sn. Antonio, 5. IV, C. S. Banks.

The name *convexa* refers to the evenly, convexly curved superior margin of scutellum in profile. From its relatives, this species can be easily recognized by the large body size, pale color pattern, long but unkeeled head, short pronotum, short lateral scutellar stripe, shallow scutellar sulcus and general shape of scutellum. In superficial appearance, it looks like *ensifera*, but structurally it is near *philippinensis* and *mindanaensis*.

Machaerota confusa Maa, n. name Figs. 19I, 27E.

Machaerota luzonensis, Baker 1919: 71, pls. 1 (6, 12) & 2 (5, 6, 13), ♀ (key, descr.; Mindanao) (misidentification, excl. ♂).

Female: Tylus shining, weakly convex; vertex thickly haired, almost flattened, antennal ledge raised; tentorial pit deep, transverse; ocellar area gently descending forward and laterad; occipital margin not reflexed except behind each tentorial pit; ocellus slightly closer to median line of head than to eye (Baker figured and wrote "ocelli as near median line as to eyes", but this is true only in dorsolateral view of head). Pronotum with deep but not sharp reticulation, meshes mostly narrower than rims at anterior 1/2 (excl. ante-callus area), as wide as rims at other 1/2; median carina sharp, high but anterior 1/6 and posterior 1/2 fairly weak; lateral angle broadly rounded, lacking oblique ental carina, reaching or nearly reaching level of basal sclerites of closed tegmen; posterolateral angle acute, slightly bent ventrad; anterolateral margin weakly incurved, almost rounded-off at anterior 1/3, slightly reflexed at other 2/3; posterolateral submarginal area quite narrowly depressed. Scutellum lacking median carina; meshes of reticulation mostly narrower than rims; lateral stripe indistinct, broad, not raised, posteriorly slightly narrowed and upcurved, meeting rim of sulcus; lateral surface hardly depressed below sulcus. Scutellar sulcus deep, 1/2 as long as scutellum, as wide as ocello-ocular distance. Basidorsal carina of scutellar process scarcely entering scutellar sulcus. Tegmen smooth, not wrinkled at apical and discoidal cells, the latter 3× as long as wide, widest before middle. Further characters as in Baker's description and illustrations.

MINDANAO: Holotype ♀, paratype ♀ (USNM), Davao, S. Mindanao, C. F. Baker, det. Baker as *M. luzonensis* E. Schmt.

As in the case of the syntype of *M. fusca*, the tegmen and most part of the wing at right side in one of the ♀♀ before me are missing. Presumably they have been torn off for drawing. Baker (*l. c.*) admitted that his specimens did not well fit E. Schmidt's description of *M. luzonensis*. This is confirmed by an examination of the type of the latter species,

consequently a new name is here brought forth. The same author also mentioned that he referred 2 ♀ specimens from Davao to *luzonensis*. There are 3 specimens from this locality under this name in his collection, now at the U. S. National Museum. On examining them, I was much surprised to find that they are of 2 sexes and of 2 different species. The ♀ fits Baker's description of the supposed *luzonensis* in all details and is here selected as the type of *confusa*. The ♂ is superficially similar to the ♀, and with the tegmina and wings intact at both sides, but actually it is a teneral specimen of *M. ensifera*.

Machaerota attenuata (Baker)

Conmachaerota attenuata Bkr. 1927: 534, pl. 1 (1–3), ♂.
Machaerota attenuata, Maa 1956: 233 (key).

Male: Anteclypeus weakly keeled and wrinkled; postclypeus rather evenly convex, not keeled. Crown shining, thinly haired and in vertical view, anterior margin gently arcuate, not "strongly subangulate" as held by Baker (his figure was probably drawn in dorsocaudal view, but even so, the anterior margin is actually not so acute at middle and so obliquely straight as figured); tylus much shorter than wide, nearly flat, anteriorly with a large shallow pit; transverse frontal suture deep; ocellar area more raised than tylus, strongly descending laterad, about 2/5 as long as interocellar distance; side piece of vertex hardly depressed, distinctly reflexed along antennal ledge and lateral frontal suture; tentorial pit deep, transverse; ocellus practically touching frontal suture, closer to median line than to eye. Pronotum very thinly haired except at ante-callus area; median carina very strong at anterior 1/3, scarcely definable at posterior 1/3; antero- and posterolateral margins subequal in length; lateral angle broadly rounded, extending to level of basal sclerites of closed tegmen; oblique ental carina and lateral ampliation poorly developed; posterolateral angle narrowly rounded, not protruding. Scutellum flattened at basidorsal area; lateral surface not depressed and in dorsal view, well exposed at sides of sulcus; sulcus yellow (with 2–3 black spots on posterior part of rim), deep, wrinkled, widest near apex where it is slightly narrower than interocellar distance; rim of sulcus not explanate. Basidorsal carina of scutellar process entering 1/3 of sulcus, apically gradually widened; basilateral depression much shorter than postero-inferior margin of scutellum. Tegmen largely smooth, apical cells feebly wrinkled; length and width of discoidal cell about 5 : 3. Further characters as in original description. Relative lengths and widths of head and pronotum 4 : 14 and 8 : 11.5 respectively. (Genitalia not examined).

MATERIAL EXAMINED: MINDANAO: Holotype ♂ (USNM), Zamboanga.

This species is chiefly characterized by the weakly convex, exceptionally shallow scutellum (in profile), short narrow scutellar sulcus and absence of lateral scutellar stripe. In certain respects, it resembles *M. rastrata* of Indonesia but the shape of head and pronotum is different. The type has been slightly crushed, and its mid and hind legs are missing at right side. The claval vein is forked at both tegmina in the type.

Machaerota fusca Baker Figs. 19J, 28I.

Machaerota fusca Bkr. 1919: 72, pls. 1 (7, 8, 13) & 2 (2, 7, 10), ♀.

Female: Crown shining, thinly haired. Tylus gently descending laterad, its discal depression anteriorly quite deep, posterior margin distinctly more raised than anterior margin

of ocellar area. Supra-antennal triangle medially foveate, posteriorly separated from vertex proper by an obliquely curved fovea; side piece of vertex weakly convex; tentorial pit deep, transversely linear; ocellar area as long as interocellar distance, gently descending forward, median 1/3 (*i. e.*, the "chocolate" area) finely rugose; ocellus much closer to occipital margin than to tylus. Pronotum shallowly punctate-reticulate; reticulation meshes near median line about as long as wide and about as wide as rims; meshes at pale-colored area more or less coarser, wider than long and often narrower than rims; ante-callus area finely, rather sparsely punctate; lateral angle broadly rounded, not reaching level of basal sclerites of closed tegmen, its oblique ental carina weak, short; posterolateral angle broadly rounded; anterolateral margin weakly carinate at anterior 1/2, distinctly reflexed at posterior 1/2; posterolateral submarginal area quite narrowly depressed. Scutellum with meshes of reticulation more or less sharper and closer to one another than those in pronotum; lateral surface flattened, not depressed below rim of sulcus. Scutellar sulcus shallow, very feebly wrinkled, shining, nearly 3/4 as long as scutellum; rim of sulcus distinctly convergent caudad (in Baker's figure, the rims were drawn as if only 2/5 as long as scutellum and slightly convergent at both ends, but in his key to species, the sulcus was correctly stated "much more than 1/2 length of body of scutellum"). Scutellar process with quite narrow basidorsal carina; basilateral depression longer than postero-inferior margin of scutellum. Tegmen smooth, not wrinkled at apical and discoidal cells, the latter 4× as long as wide. Further characters as in the original description.

Male: Similar. (Genitalia not examined).

MATERIAL EXAMINED: LUZON: 1 ♂, 1 ♀ (USNM, syntypes), Baguio, Benguet; 1 ♀ (MCZ), Acupan, Benguet, 12. VII, C. S. Banks.

This elegant species is quite unusual for the genus in the following points: lateral stripe of scutellum and discoidal cell of tegmen exceedingly long; scutellar sulcus long, shallow and shining; lateral surface of scutellum not depressed below rim of sulcus; supra-antennal triangle foveate, etc.

Baker mistook both syntypes as ♀♀. The one bearing a red name label is actually a ♂, it is here selected as lecto-holotype. The other, a ♀ without red name label, is accordingly selected as lecto-allotype.

Machaerota virescens Maa

Machaerota virescens Maa 1956: 234, pls. 1 (1–4) & 2 (9), ♂. Type, Luzon: Agoo (La Union) 235 km N of Manila (MNL).

This species is evidently a close relative of *M. ensifera*. It is known only from the unique type.

Machaerota ensifera Burmeister Figs. 21 B, P, W, 27F.

Machaerota ensifera Burm. 1835: 128.—Signoret 1879: 48, ♂ (descr.; "Silhet").—E. Schmidt 1907: 186 & 187, fig. 7, ♀ (key, redescr.; Manila).—Baker 1919: 69 & 71, pls. 1 (4, 5, 11, 14) & 2 (3, 4) (key, descr.; "abundant throughout the Philippines").—Maa 1956: 236, pl. 2(10) (variation, key, ♂ abd. apex; Luzon, Leyte, Mindoro). Wrongly spelled by Kato (1933: 31; 1933a: pl. 47) and Matsumura (1940: 82) as *encifera*.

Machaerota ensiferina E. Schmidt 1907: 190, ♂ (n. name for *ensifera* Sign.). **New Syno-**

nymy.

Machaerota luzonensis, Baker 1919: 71, ♂ (in part, misidentification). **New Synonymy.**
Conmachaerota bakeri Lallemand 1951: 82, ♂♀. **New Synonymy.**

Postclypeus weakly convex, strongly declivitous. Tylus discally flattened, posteriorly descending; side piece of vertex flat, rather broad, almost lying on same plane as tylus; tentorial pit small, not distinctly transversely foveate as in *M. notoceras*; occipital margin weakly sinuate at middle, seldom angulately incised. Pronotum proportionally broader than in *notoceras*; its punctures rather variable in size and shape, denser in ♀ than in ♂; those on yellow area roundish and interspaced by weak irregular undulating rugae, those on brown area polygonal and interspaced by sharp reticulation-rims; calli long, broad; antero- and posterolateral margins subequal in length; posterolateral angle well-defined, not broadly rounded as in Baker's figure; ante-callus area laterally more strongly descending than in *notoceras*. Lateral stripe of scutellum long, horizontal, evenly broad, apically not upcurving toward or meeting dorsal sulcus; basidorsal carina of process entering 1/4–1/3 of sulcus.

HOST PLANTS: *Gossypium* spp., *Hibiscus* sp. (Malvaceae).

MATERIAL EXAMINED: LUZON: 1♂, 1♀ (CAS), Alabang 12. VII. 1929, J. Valdez; 1 ♀ (USNM), Baguio, C. F. Baker; 2 ♀♀, several nymphal tubes (HSPA), Calamba, Los Baños, 26. IV. 1927, R. V. van Zwaluwenburg; 1♀ (USNM), Limay (?), Bataan, R. C. McGregor; 1♀ (BISHOP), Los Baños, 1916–17, F. X. Williams; 3♀♀ (USNM), same, C. F. Baker; 1 ♀ (BISHOP), Manila, 21. VIII. 1945, H. E. Milliron; 3 ♂♂, 4 ♀♀ (BRN), same, X. 1913, G. Boettcher; 1♂, 1♀ (WN), same, Raszlag coll.; 1♂, 2♀♀ (BMNH, type ♀ and paratypes of *bakeri*), Manila, II. 1920; 1 ♀ (USNM), Manila, W. A. Stanton; 2 ♂♂, 1♀ (USNM), same, C. S. Banks; 1♂, 2♀♀ (STK), same, Kinb. coll.; 1♂, 3♀♀, 4 nymphal tubes (USNM), same, on *Hibiscus*, G. Compere; 2♂♂, 6♀♀ (USNM), Mt. Maquiling, Baker; 1♂ (BISHOP), Montalbom Dam, 16. III. 1960, Maa; 1 ♂, 2 ♀♀ (CAS), Pagsanhan, Laguna, 19. X. 1931, F. C. Hadden; 1♀ (HSPA), Pasig; 3♀♀ (STK), all bearing "Type" labels, "Ins. Philipp.", Semper; 3♂♂, 1♀ (USNM *ex* coll. Bur. Agr. P. I.), no locality label, C. R. Jones. NEGROS: 1♀ (USNM), V. 1911, C. V. Piper; 1♀ (BISHOP), L. Balinsasayao, Negros Or., 29. IX. 1959, L. W. Quate & C. M. Yoshimoto; 1♂ (BISHOP), Sibulan, 0–300 m, Negros Or., 30. IX. 1959, Yoshimoto; 2 ♀♀ (BISHOP), Canlaon, 915 m, 20. XII. 1959, Quate; 1 ♂ (USNM), Cuernos Mts., Baker. BILIRAN IS.: 1♂ (USNM), Baker. TAYABAS: 2♂♂ (USNM), Malinao, Baker. SIQUIJOR IS.: 1♂ (USNM), VII. 1925, McGregor. BASILAN: 1♂ (LDN); 1 ♀ (USNM), Baker. MINDANAO: 1♀ (LDN), Zamboanga, 17. VIII. 1952, L. D. Brongersma & W. J. Roosdorp; 2♂♂ (BISHOP), 29 km N of Zamboanga, 160 m, 10–11. IX. 1958, H. E. Milliron; •1♀ (BISHOP), Bukidnan, Mt. Katanglad, 1250 m, 9. VII. 1959, Quate; 1♀ (BISHOP), Zamboanga del Norte, Manucan, 0–300 m, 11. X. 1959, Quate; 1♀ (BISHOP), Zamboanga del Norte, Pohinog R., 500–600 m, 18. X. 1959, Quate; 1 teneral ♂ (USNM), Davao, det. Baker as *M. luzonensis* E. Schmt.; 1♂ (CM), Calian, 24. V. C. S. Clagg; 1♂, 2♀♀ (USNM), Dapitan, Baker; 1♂ (USNM), Surigao, Baker; 1♀ (USNM), Iligan, Baker; 1♀ (USNM), Kolambugan, Baker; 1♀ (USNM), Mt. Banahao, Baker. LEYTE: 3♂♂, 2♀♀ (CM), San José, 29. I. 1945, E. Ray. BUSUANGA IS.: 1♂, 2♀♀ (CM), Dimaniang, on shrub leaf over stream nr. sea level, 14. III. 1947, H. Hoogstraal. SULU IS.: 1♂ (BISHOP), Jolo, 24.VIII.1958, Milliron. PALAWAN: 1♀ (CM), Puerto Princesa, sea level, on cucurbit-vine edge forest, 15.IV.1947, Hoogstraal;

3♂♂, 6♀♀ (USNM), Puerto Princesa, Baker. BALABAC: 1♀ (STK); 1♀ (BRN), det. L. Melichar. "SYLHET": 1♂ (WN, holotype of *ensiferina* E. Schmt.). "MALACCA": 1♂, 1♀ (STK), coll. Kinb.

The type, a ♀ from Manila not seen by me, is in Berlin Mus. Examinations of the holotype ♂ *ensiferina* E. Schmt. and type series of *bakeri* Lall. proved that both are synonyms of *ensifera* Burm. The former was mislabeled as from Silhet and is 6.1 mm long incl. tegmina (4.2 mm excl. tegmina), and the latter represents a slight individual variation of claval vein. The 2 odd specimens from Malacca are certainly mislabelled. If this common lowland species is definitely established in Malaya, it should be found in recent collections from that area. Metcalf (1960: 34), relying upon the literature, wrongly listed this species from Java, N. India, Assam, Burma, Taiwan and Japan.

One of the 2 ♀♀ from Canlaon, Negros Orient. is unusually large and pale. Its body measures 7.8 mm long (to apex of scutellar process 8.4 mm) and including abdomen, it is almost uniformly greenish white. The median facial stripe is only as broad as antennal socket; lateral facial lines and pronotal and scutellar stripes all poorly defined; lateral surface of scutellum proper slightly stained with brown at posterior 1/3. The other ♀ of the same lot is normal in size and color pattern.

This is one of commonest species of the family. From the records listed above, the adults are probably to be found around the year. The species occurs all over the lowlands

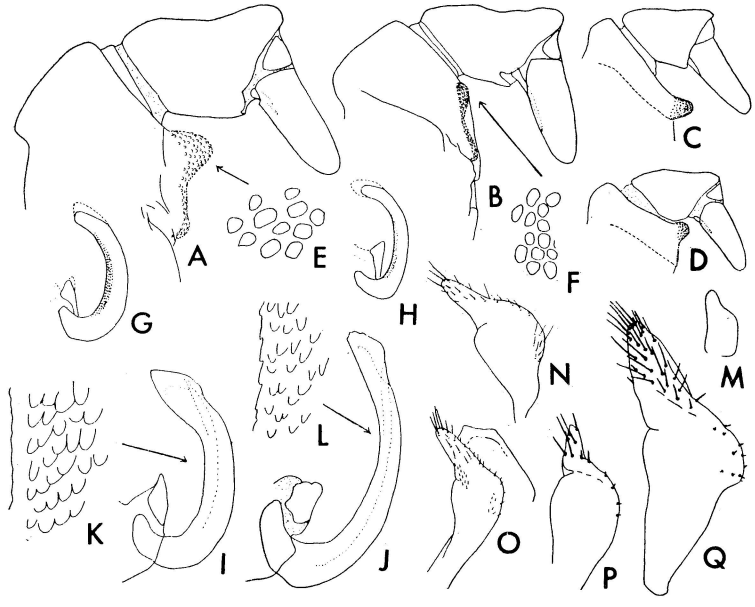

Fig. 23. *Machaerota* spp.: *formosana* Kato, holotype (D, H, M, N), *flavolineata* Dist., Vietnam (B, F, I, P), *takeuchii* Kato from Honshu (A, E, J, L, Q), *spangbergii* Sign. from Bengal (C, G, O). ♂ genitalia, upper part, side view (A–D); scabrous area of pygofer, sculpture (E, F); aedeagus and periandrium, side view (G–J); aedeagal scales (K, L); basal plate, side view (M); paramere, side view (N–Q, basal plate partly shown in O). Figures drawn at different magnifications.

of the Philippines, but its introduction into Palawan and Balabac is probably rather recent. Zoogeographically, the latter 2 islands belong to the Malaysian subregion. The supposed occurrence in Sylhet, as in Malacca, certainly resulted from mislabelling.

KEY TO MACHAEROTA SPECIES OF MALAYSIAN SUBREGION

1. Scutellum in profile with basal depth of process subequal to length of postero-inferior margin, no lateral stripe; posterolateral angle of pronotum broadly rounded, never protruding out (see under enumeration of Wallacea species)... ..... **rastrata**

   Scutellum in profile with basal depth of process much smaller than length of postero-inferior margin, its lateral stripe clearly defined 2

2 (1). Profile depth of scutellum equal to or hardly less than length along lateroventral margin; face in profile subangular to crown; lateral stripe of scutellum evenly broad, strongly curved, apically touching or nearly touching rim of sulcus ..... **subnasuta**

   Profile depth of scutellum much less than length along lateroventral margin; face in profile (except in *palawana*) broadly rounded-off to crown; lateral stripe of scutellum not as above 3

3 (2). Antero- and posterolateral margins of pronotum subequal in length; body yellow, pronotum with concolorous punctures and 5 distinct brown stripes (see under enumeration of Philippine species) ..... **ensifera**

   Anterolateral margin of pronotum markedly longer than posterolateral margin; body color never as above 4

4 (3). Scutellar sulcus exceptionally shallow and broad, its breadth not less than 1/2 of interocular distance; lateral stripe of scutellum horizontal, straight, not more than 1/3 as long as scutellum; superior margin of scutellum in profile hardly curved; posterolateral angle of pronotum scarcely projecting out; apical and discoidal cells of tegmen irregularly wrinkled..... **luzonensis**

   Scutellar sulcus normal, its breadth much less than 1/2 of interocular distance; lateral stripe of scutellum not as above; superior margin of scutellum in profile (except in *latior*) distinctly curved and forming "neck" region..... 5

5 (4). Relative breadths of head and pronotum about 24 : 41; lateral margin of pronotum distinctly explanate; superior margin of scutellum in profile gently curved, never forming a distinct "neck" region; apical and discoidal cells of tegmen smooth; posterolateral angle of pronotum not projecting out..... **latior**

   Pronotum proportionally narrower, its lateral margin hardly explanate; superior margin of scutellum in profile distinctly curved and forming "neck" region.....6

6 (5). Posterolateral angle of pronotum distinctly projecting out; apical and discoidal cells of tegmen irregularly wrinkled ..... **notoceras**

   Posterolateral angle of pronotum not projecting out 7

7 (6). Lateral stripe of scutellum apically meeting rim of sulcus; tegmen with a conspicuous brown stripe covering apical cell 1 and thence extending to tegminal apex; tylus much shorter than broad; crown in profile rounded-off to face; scutellar process strongly arched, much longer than scutellum proper...**signatipennis**

   Lateral stripe of scutellum far from meeting rim of sulcus; tegminal apex at most slightly tinted with yellowish brown, never with a conspicuous brown

stripe 8

8 (7). Apical cells of tegmen wrinkled; postclypeus distinctly keeled (see under enumeration of Philippine species) ..... **palawana**

Apical cells of tegmen smooth; postclypeus not keeled; scutellar process strongly arched and much longer than scutellum proper..... **andamanensis**

Machaerota notoceras E. Schmidt Figs. 21 H, L, U, ZZ, 27G.

Machaerota notoceras E. Schmt. 1907: 192, ♀.—Maa 1949: 14, fig. 2 (♂ abd. apex; Java records).

Conmachaerota notoceras, Baker 1919: 69 & 70, pl. 1 (1, 9) (key; Penang).

Body covered with silvery hairs (E. Schmidt said hairs on vertex "hell-gruener", which is probably a *lapsus calami* for "hellgrauer"). Postclypeus finely, sparsely punctate, lower part more densely so; lateral transverse lines paler than median stripe (E. Schmidt in his key said these lines brown and stripe black, but in his description said both black) and interspaced by thickly haired rugae. Crown finely, densely punctate and long-haired; tylus convex, posteriorly descending; side piece of vertex almost flat, less elevated than tylus; occipital margin weakly reflexed, gently sinuate at middle; ocellar area anteriorly descending, posteriorly raised at middle; ocelli much closer to eyes than to each other (in Baker's figure, closer to each other than to eyes). Pronotum broadly rounded at lateral angle; posterolateral angle acute, projecting ventrad; oblique ental carina of lateral angle short, weak or absent; calli long, narrow, curved; posterior 1/3 of median carina poorly defined; posterior 3/5 of anterolateral margin and entire posterolateral margin weakly reflexed, hardly explanate. Scutellum in profile with neck region distinct, and with superior margin incurved before middle; lateral stripe moderately broad, slightly curved, not reaching rim of sulcus; sulcus 3/5 as long as scutellum, almost evenly broad, moderately deep; median carina weak, variable in height 1/4–1/2 as long as scutellum; scutellar process longer than scutellum, gently arched in profile, its basidorsal carina usually hardly entering sulcus. Tegmen irregularly wrinkled at discoidal and apical cells, uniformly yellowish at apical 1/2, gradually becoming paler toward base; costal and anal margins basally black; veins brownish, with fine scattered setigerous punctures. Body length ♂ 5.5–6.0 mm, ♀ 6.2–6.8.

HOST PLANT: *Vitex pubescens* (Verbenaceae).

MATERIAL EXAMINED: MALAYA: 1♀ (BISHOP), Penang, 22–26. XII. 1958, Maa; 5♂♂, 6♀♀ (USNM), Penang, C. F. Baker; 1♀, 1♂ (BMNH), Kuala Lumpur, 10. VI. 1936, H. M. Pendlebury; 1♂ & nymphal tube (BMNH), Kuala Lumpur, nr. Lake Garden, on *Vitex pubescens*, 3. I. 1938, Pendlebury; 1 ♀ (BMNH), Port Dickson, Negri Semilan, 5. I. 1925, Pendlebury; 1♀ (BMNH), Kuala Lumpur, 10. VIII. 1943, R. Takahashi; 1♀ (BISHOP), Kuala Terenggan, Pahang, 220 m, 15. XII. 1958, Gressitt; 1♀ (USNM), Singapore, C. F. Baker. BORNEO: 1 ♀ (USNM), Sandakan, Baker. SUMATRA: 1 ♀ (WSW, cotype), Soekaranda, H. Dorhn. JAVA: 1♀ (WSW, cotype), H. Fruhstorfer.

The 2♀♀ from Penang are "gelbbraun" and are identical in color with the cotypes, but the ♀♀ from Kuala Lumpur and Kuala Terenggan are unusually dark and their scutellums have a less distinct "neck" region. The neck region is also less distinct in the Java cotype. I am selecting the Sumatra cotype as the lecto-holotype, which matches very well with Baker's figures and the 2 Penang ♀♀. The occurrence of this species in Borneo needs verification.

This and the 3 following species from a compact "Formenkreis", and their distinction is slight.

Machaerota signatipennis Maa, n. sp. Figs. 19K, 21 E, R, V, 27H.

Male: Allied to *M. notoceras*, but size smaller and color pattern slightly darker than examples of the latter species from Penang. Posterolateral angle of pronotum not pointed, not projecting out. Scutellum in profile much slenderer than in *notoceras*, particularly its process; sulcus 2/3 as long as scutellum, narrowed anteriorly, deeper than in *notoceras*; lateral stripe narrow, apically meeting rim of sulcus. Scutellar process strongly arched, its basidorsal carina entering 1/3 of sulcus. Tegmen irregularly wrinkled at apical and discoidal cells, with a short brown stripe covering apical cell 1 and extending to tegminal apex. Body length 5.5 mm, to apex of scutellar process 6.1.

Female: Similar. Body length 4.8 mm, to apex of scutellar process 5.5.

MALAYA: Holotype ♂ (BMNH), Kuala Lumpur Gardens, Selangor, 17. X. 1938, H. M. Pendlebury. Allotype ♀ (BMNH), Kuala Lumpur, 9. VIII. 1943, R. Takahashi. Paratypes 1♀ (BMNH, ex Lallemand coll.), Kuala Lumpur, 10. VII. 1921, Pendlebury; 1 damaged example (BMNH), same data, but 12. X. 1935.

Machaerota latior Maa, n. sp. Figs. 19L, 22 G, L, U, 28J.

Male: Closely allied to *M. notoceras*, but darker and larger. Pronotum proportionally much broader and its lateral angle more narrowly rounded than in *notoceras*; relative breadths of head and pronotum 24 : 41; posterolateral angle not pointed, not projecting out; lateral margin distinctly explanate. Scutellum in profile lacking neck region, its superior margin gently arched or hardly incurved; lateral stripe broad, nearly reaching sulcus; basidorsal carina of process entering 1/3 of sulcus. Tegmen not wrinkled at discoidal and apical cells, lacking brown mark at apex; discoidal cell proportionally longer than in *notoceras* or *signatipennis*, about 21 : 7 as long to broad. Body length 6.0 mm, to apex of scutellar process 6.3.

Female: Similar, slightly darker. Body length 6.5–7.3 mm, to apex of scutellar apex 6.7–7.5.

MALAYA: Holotype ♂ (BMNH), Gadong Raja Rahin, Upper Perak, 8. IX. 1938. Allotype ♀ and paratype ♀ (BMNH), same data.

The name *latior*, broader, refers to the pronotum by which this species is rather easily separable from other Malaysian members of the genus.

Machaerota luzonensis E. Schmidt Figs. 19M, 22 B, K, P, 27I.

Machaerota luzonensis E. Schmt. 1907: 189, ♀.
Machaerota sp., Maa 1949: 18.

Male (undescribed): Differing from *M. notoceras* in the following points. Brownish black. Lateral stripe of scutellum nearly straight, apically not curved upward. Tegmen not uniformly pigmented, but pale yellowish and with yellowish veins at basal 3/5, pale brownish with brownish veins at apical 2/5 (extreme base and costal and anal margin, as in *notoceras*, marked with brown).

Crown anteriorly very broadly rounded; interocellar distance scarcely greater than ocello-ocular distance; tylus flattened. Posterolateral angle of pronotum hardly projecting out. Scutellum in profile lacking "neck" region and with superior margin evenly curved; scutellar sulcus very shallow, about as broad as tylus and distinctly narrowed posteriorly. Tegmen irregularly wrinkled at apical cells (in part, but not so in discoidal cell) and apical margin. Sub-anal lobe of pygofer less strongly projecting. Relative breadths of head, pronotum and scutellum 20 : 31 : 16. Body length 4.7–5.2 mm.

Female: Similar, paler; pronotum often with inconspicuous brown speckles. Relative lengths and breadths of head, pronotum and scutellum proper (of holotype) 8 : 25 : 32 and 23 : 38 : 18 respectively. Body length 5.5–6.0 mm.

MATERIAL EXAMINED. SUMATRA: 3♂♂ (BMNH *ex* V. Lallemand coll.), Medan, E. Mjöberg; 1♂, 1 ♀ (WSW, *ex* E. Schmidt coll.), Medan S. O. K., 16–18. II. 1922, L. Fulmek. JAVA: Neallotype ♂ (LDN), Moeara Antjol, nr. Batavia, XII. 1907, E. Jacobson; 1 ♂, 1 ♀ (LDN), Java Orient., VIII. 1871, C. Mulii; 1 ♂ (LDN), lacking abdomen and left tegmen, N. O. I. Tjideres, 100 m, Res. Cheribon, 8. IV. 1938, F. C. Drescher; 1 ♀ (BRN), Srondol, Semarang, VIII. 1909, Jacobson. "LUZON": Holotype ♀ (BRX), Manila, coll. Kinb.

The salient characters of this species are the short and flattened tylus and the broad and shallow scutellar sulcus. The profile shape of scutellum is slightly variable, but never has a distinct neck region as in *notoceras*; median carina of pronotum and scutellum is also slightly variable.

The holotype is in fairly good condition, although its scutellum and abdomen have been glued on. Its claval vein is unbranched at left side, but clearly branched at right side (E. Schmidt said it was simple). In the ♀ from Sumatra, left tegmen with 3 apical branches, 2 basals close and parallel to each other.

The name *luzonensis* is confusing, since this species certainly does not occur in the Philippines. The correct type locality is most probably Malaya. In the case of *M. ensifera* Burm. which is very common and widely distributed in the Philippines but not found elsewhere, the same collector "Kinb." had 1 ♂, 2♀♀ (STK) labeled Manila, and 1♂, 1♀ (STK) as if from Malacca. Jacobi's (1921 : 4) suppression of *luzonensis* as a synonym of *ensifera*, which was followed by Metcalf (1960 : 33), is certainly untenable. For Baker's misinterpretation of *luzonensis*, see discussion under *M. confusa*, n. name.

Machaerota andamanensis Distant

Machaerota andamanensis Dist. 1907 : 83.

Male: Pronotum chestnut brown, with indistinct black speckles. Scutellum reddish brown, richly speckled black on lateral surface; lateral stripe 1/2 as long as scutellum, strongly curved. Tegmen evenly and weakly tinted yellowish; costal (basal 1/3) and anal margins brownish black; veins brownish yellow, distinctly darker than ground color, with numerous brownish black granules of different sizes (mostly much wider than veins themselves) thus giving "purplish black" appearance of veins as termed by Distant. Hind tibia largely yellow.

Head short. Face feebly keeled and in profile, subangulate to crown. Tylus slightly convex, more raised than side piece of vertex; occipital margin angularly incised at middle,

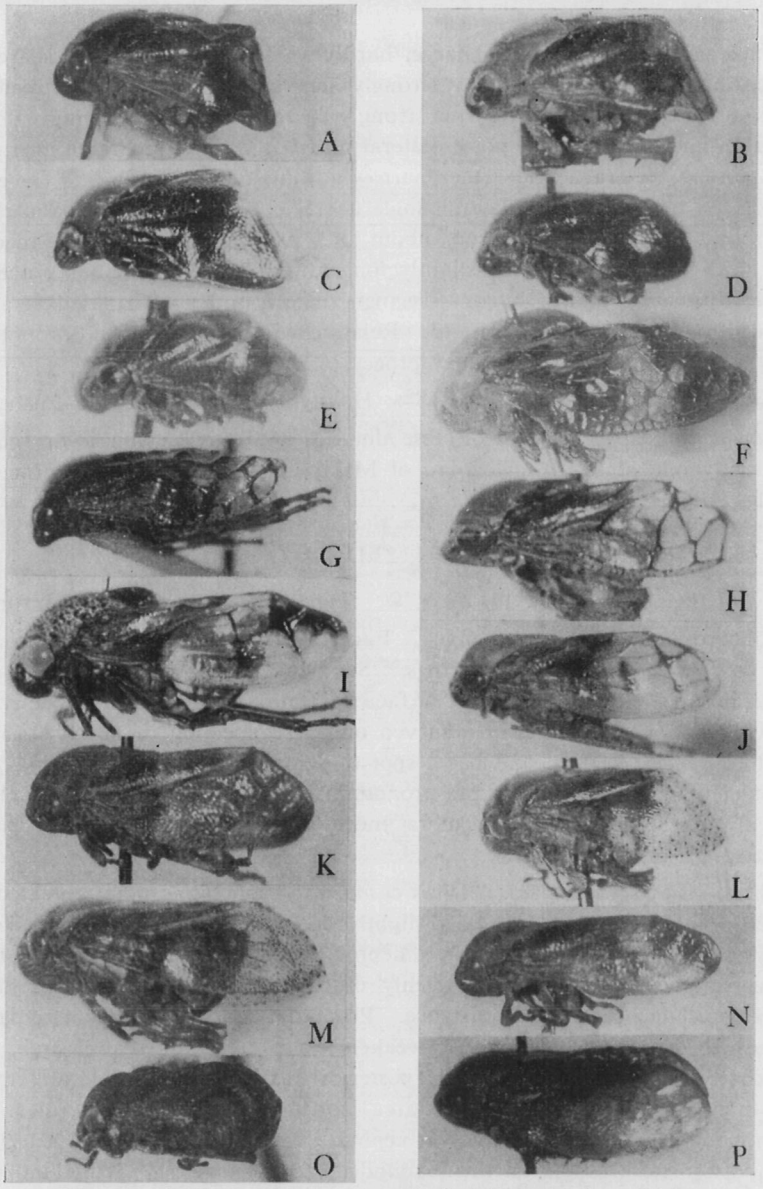

Fig. 24. A, *Soamachaerota appendiculata* Hack. ♀ from Woogaroo *ex* Hacker coll.; B, *Hindoloides indicans* Dist. ♀, Calcutta, probably paratype; C, *H. bipunctata* Hpt. ♀, Takushima; D, *Trigonurella simonthomasi* Maa ♀, allotype; E, *T. szentivanyi* Maa ♀, allotype; F, *Apomachaerota reticulata* E. Schmt. ♀, neallotype; G, *Serreia notabilis* Bkr. ♂, syntype; H, *Machaeropsis rubrilineata* Maa ♀, holotype; I, *Enderleinia bispina* E. Schmt. ♀, Ivory Coast; J, *Neuromachaerota discigutta* Maa ♀, holotype; K, *Polychaetophyes serpulidia* Kirk. ♀, holotype; L, *Taihorina geisha* Schum. ♀, Vietnam; M, *T. simplex* Maa ♀, allotype; N, *Makiptyelus dimorphus* Maki ♂, Taihoku; O [not Machaerotidae], *Parahindoloides lumuana* Lall. ♂, topotype; P [not Machaerotidae], *Pseudomachaerota olivacea* Mel. ♀, holotype. Photographs not in same magnification.

weakly reflexed at sides; tentorial pit large, hardly wider than long; ocelli scarcely further to each other than to eyes. Pronotum strongly convex; anterior 1/2 of median carina strong, areas at sides of this part of carina strongly descending laterad; anterolateral margin weakly sinuate, much longer than posterolateral margin; lateral ampliation narrow; oblique ental carina absent; lateral angle rather narrowly rounded, extending to level of basal sclerites of closed tegmen; posterolateral angle acute, but not spine-like. Scutellum highly arched in profile; sulcus narrow, deep, about 3/5 as long as scutellum; median carina indistinct; "neck" region in profile slightly longer than deep. Scutellar process long, its carina entering posterior part of sulcus. Tegmen smooth and not wrinkled at apical cells; length and width of discoidal cell 31 : 13. Relative widths of head and pronotum 39 : 56. Body length 5.5 mm, to apex of scutellar process 6.3.

MATERIAL EXAMINED: ANDAMAN IS.: Holotype ♂ (BMNH), no further details.

M. andamanensis shows no sign of close affinities with any Ceylonese or Indian species and is apparently related to *M. subnasuta* of Malaysia, but its scutellar process is much longer and less highly arched.

Machaerota subnasuta Maa Figs. 19N, 22 D, M, O, Q, 27J.

Machaerota subnasuta Maa 1949: 17, fig. 4, ♀. Type, Java: Semarang teak forest (LDN).

Male (undescribed): Brownish black. Face broadly black along median line. Pronotum with some irregular black markings. Scutellum with 3–6 and about 6 large black spots on lateral surface and along outer surface of rim of dorsal sulcus respectively; lateral stripe yellow, broad, long, posteriorly curved upwards, meeting or nearly meeting rim of sulcus; postero-inferior margin and basal spot of scutellar process also yellow; basidorsal area much paler than lateral surface and pronotum. Tegmen pale yellowish, veins blackish brown, apical ones slightly paler. Femora more or less darker than other parts of legs. Abdominal tergites largely black.

Head short. Face not keeled. Tylus confluently punctate, more elevated than side piece of vertex, weakly convex, discally slightly depressed; lateral and transverse frontal sutures equally deep; side piece of vertex depressed; antennal ledge raised; tentorial pit deep, transverse; ocellar area gently, evenly descending forwards; interocellar distance distinctly greater than ocello-ocular distance. Pronotum coarsely, deeply reticulate; median carina exceedingly strong at anterior 2/3, weak at apical 1/3; ante-callus area, as in tylus, finely, confluently punctate; anterolateral (posterior 2/3) and posterolateral (entire length) margins distinctly reflexed, submarginal area narrowly depressed; lateral angle broadly rounded, with oblique ental carina, and, in cephalic view, exceeding basal sclerites of closed tegmen; posterolateral angle narrowly rounded, not protruding. Scutellum more coarsely reticulate than pronotum, rims of meshes very narrow, knife-like at lateral surface, much broader at basidorsal surface; lateral stripe shallowly, rather sparsely punctate; lateral surface slightly depressed below rim of sulcus; sulcus deep, 2/3 as long as scutellum, slightly narrower than interocellar distance; apical process much shorter than scutellum proper, obliquely straight. Tegmen wrinkled at apical margin and corial appendix, elsewhere smooth; length to width of discoidal cell 17 : 7. Relative breadths of head, pronotum and scutellum 21 : 37 : 17 (interdistance of basal sclerites of closed tegmina 36). Sub-anal lobe of pygofer prominent; anal style much shorter than anal segment. Body length 5.6 mm, to apex of scutellar process also 5.6.

SUMATRA: Neallotype ♂ (LDN), Fort de Kock, 920 m, 1924, E. Jacobson.

KEY TO MACHAEROTA SPECIES OF INDO-CHINESE AND MANCHURIAN SUBREGIONS

(Not including *M. punctatonervosa* Sign. which has been mis-recorded from China)

1. Scutellum in profile deepest much before base of scutellar process, and about as deep as long along ventrolateral margin; scutellar process not longer than scutellum proper; postclypeus distinctly keeled; head short..... **exaggerata**
Scutellum in profile deepest at base of scutellar process, and usually distinctly shallower than long; scutellar process often longer than scutellum proper; postclypeus rarely keeled..... 2

2 (1). Head subangularly produced forward both in dorsal and lateral views; lateral stripe of scutellum subtriangular, horizontal, not upcurved, 1/3 as long as scutellum; antero- and posterolateral margins of pronotum subequal in length; postclypeus distinctly keeled ..... **esakii**
Head broadly rounded anteriorly; lateral stripe of scutellum not as above; anterolateral margin of pronotum usually distinctly longer than posterolateral margin 3

3 (2). Posterolateral angle of pronotum broadly rounded; apex of scutellar process not surpassing apices of closed tegmina; apical cells of tegmen smooth..... 4
Posterolateral angle of pronotum acute or spine-like; apex of scutellar process well surpassing apices of closed tegmina; apical cells of tegmen usually wrinkled 8

4 (3). Pronotum exceptionally short and broad (*ca.* 27 : 41), with lateral angle not extending beyond level of basal sclerites of closed tegmen, posterolateral margin strongly curved, only about 2/3 as long as anterolateral margin; tylus concave; scutellar process hardly longer than scutellum proper; scutellar sulcus long and deep..... **formosana**
Pronotum either not so short and broad, or with lateral angle extending beyond level of basal sclerites of closed tegmen..... 5

5 (4). Median carina of scutellum strong at base, gradually weakened toward apex; basidorsal area of scutellum gently descending laterad, sulcus about 1/2 as long as scutellum; lateral stripe broad, straight, not more than 1/3 as long as scutellum ..... **flavolineata**
Median carina of scutellum either stronger at middle than at basal and apical 1/3, or entirely weak or obscure; when basidorsal area of scutellum gently descending laterad, then sulcus 2/3 as long as scutellum; lateral stripe of scutellum not as above..... 6

6 (5). "Pronotum black, discally with 2 large brown markings extending nearly to posterior margin; face keeled; tegminal veins largely greyish black, apically brownish; crown anteriorly distinctly raised; interocellar distance greater than ocello-ocullar distance; body (♀) 7 mm long"..... ***taiheisana**
Pronotum not colored as above; face not distinctly keeled..... 7

7 (6). Tylus convex; discoidal cell of tegmen 2.5× or more as long as broad, 4 or 5× as long as basal adnation of M and Cu; basidorsal area of scutellum strongly descending laterad ..... **takeuchii**

Tylus concave; discoidal cell of tegmen not more than 2× as long as broad, only 1/2 longer than basal adnation of M and Cu; basidorsal area of scutellum weakly descending laterad ..... **fukienicola**

8 (3). Legs including hind tibia uniformly reddish brown; scutellar process hardly longer than scutellum proper; superior margin of scutellum in profile almost straight ..... **brunnipes**

Hind tibia almost entirely yellow, distinctly paler than other parts of legs; scutellar process distinctly longer than scutellum proper 9

9 (8). Lateral angle of pronotum extending well beyond level of basal sclerites of closed tegmen; lateral stripe of scutellum short, straight, far from meeting rim of sulcus ..... **assamensis**

Lateral angle of pronotum not extending beyond level of basal sclerites of closed tegmen 10

10 (9). Scutellum in profile about 1/2 as deep as long and with superior margin almost straight; discoidal cell of tegmen more than (♂) or nearly (♀) 3× as long as broad, tegminal veins yellow, their extreme bases dark brown, pronotum unicolored in ♂ ..... **coronata**

Scutellum in profile either much deeper or with superior margin distinctly sinuate near middle; tegmen with either much shorter discoidal cell or veins basally paler than apically 11

11 (10). Pronotum proportionally short and broad, length to width about 25 : 38; scutellar sulcus shallow, its breadth at middle greater than interocellar distance; pronotum and scutellum not unicolored, with numerous brown to black speckles which are distinctly darker than ground color ..... **coomani**

Pronotum proportionally long and narrow, length to width about 23 : 29—25 : 30; scutellar sulcus deep, its breadth at middle not greater (often smaller) than interocellar distance; pronotum and scutellum unicolored, except calli and ordinary scutellar pale markings 12

12 (11). Oblique ental carina of pronotum long and well defined; tegmen lacking brown apical fascia, veins at apical area uniformly yellow; lateral stripe of scutellum distinctly upcurved ..... **discreta**

Oblique ental carina of pronotum not or hardly definable; tegmen with a narrow brown apical fascia, veins at apical area largely brown; lateral stripe of scutellum nearly straight ..... **elegans**

Machaerota assamensis Distant Figs. 19O, 28K.

Machaerota assamensis Dist. 1916: 183.

Male: Pronotum chestnut brown, with black calli and punctures; venter of thorax also black; scutellum distinctly paler than pronotum, about 2.5× as long as its lateral stripe; scutellar sulcus with few black spots; tegmen almost entirely colorless, costal (basal 1/3) and anal margins brownish black, veins yellowish with few brown granules; tegminal apex a distinct brown marking which runs narrowly along apical margin of apical cells, then covers cell 1 as a whole and extends longitudinally to extreme apex of tegmen; hind tibia yellow.

Tylus convex, more raised than side piece of vertex; occipital margin strongly reflexed

for its entire length and gently sinuate at middle; ocellar area abruptly descending forward. Pronotum gently sinuate at both antero- and posterolateral margins, the former much longer than latter; anterior 1/2 of median carina prominent, areas at its sides strongly descending laterad; oblique ental carina absent. Median scutellar carina passing through sulcus, not definable at its basal 1/4 and weak at intermediate 1/3; sulcus deep, 2/3 as long as scutellum, about as wide as interocellar distance. Other characters similar to ♀ described below. (Genitalia not examined). Body length 5.8 mm.

Female: Pronotum uniformly testaceous, with brown calli and punctures. Scutellum slightly darker than pronotum; lateral stripe short, straight, slightly paler than ground color; postero-inferior margin white, much paler than lateral stripe or basal spot of posterior process; rim of sulcus with a few brown spots. Tegmen colorless at basal 1/2, becoming brownish yellow on approaching apical margin; extreme base, anal margin and basal 1/3 of costal margin fuscous; narrow stripe next to extreme tegminal base and intermediate 1/3 of costal margin white, not transparent; veins slightly darker than ground color, those at apical 1/2 of corium with a number of brown granules as wide as veins themselves. Thoracic venter much paler than pronotum, with some fuscous markings. Abdomen black, tergites 3–4 as whole and median area of others white. Postclypeus micropunctate, evenly convex, not keeled. Crown thinly haired, microsculptured; tylus flattened, hardly more raised than side piece of vertex, anteriorly broadly rounded; side piece of vertex slightly depressed; tentorial pit oblique, shallow; occipital margin weakly sinuate and reflexed; ocellar area gently descending forward; ocelli equidistant to tylus and occipital margin, much closer to eyes than to each other. Pronotum rather coarsely punctate-reticulate, meshes deep, rims not sharp, transverse rims at discal area higher and much wider than longitudinal ones and mostly wider than meshes; median carina rather low and broad, very weak at both ends; ante-callus area with sparse short hairs and fine punctures; anterior area at side of median carina gently descending laterad; lateral angle rounded, extending beyond level of basal sclerites of closed tegmen; oblique ental carina short, strong; anterolateral margin weakly carinate at anterior 1/4, distinctly reflexed at other 3/4; posterolateral submarginal area narrowly depressed; posterolateral angle acute, slightly protruding ventrad. Scutellum sharply reticulate all-over, fairly high in profile; median carina feeble, only present inside sulcus; sulcus moderately deep, 1/2 as long as scutellum, its rim apically slightly explanate; lateral surface depressed below rim of sulcus. Tegmen moderately elongate, apex rounded; length to width of discoidal cell 19 : 7; apical cells largely smooth, distinctly concave. Body length 5.8 mm.

MATERIAL EXAMINED: ASSAM: Holotype ♂ (BMNH), "Margh." [Margherita]; 1 ♀ (USNM), Dibrugarh, 12. III. 1944, E. D. Hardy.

The ♂ of this species is closely related to *M. signatipennis* of Malaya but its size is larger, interocellar distance longer, oblique ental carina absent, median scutellar carina longer and lateral scutellar stripe shorter. Circumstances did not permit me to make a direct comparison, but it is rather possible that the ♀ described above is not conspecific and represents an unnamed species.

Machaerota elegans Maa, n. sp. Figs. 19P, 22 E, N, V, 27K.

Male: Dark castaneous, scutellum with more reddish tints, scutellar process brownish red. Anteclypeus brownish yellow, distinctly paler than its surroundings; postclypeus and

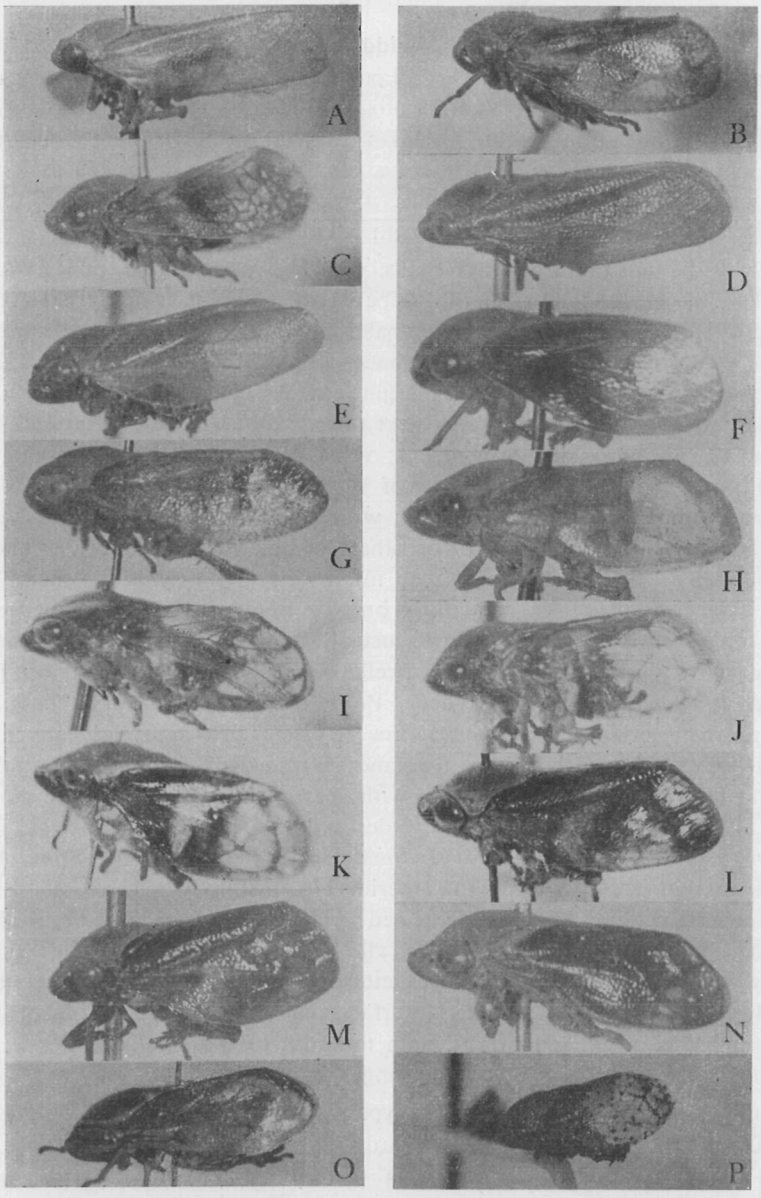

Fig. 25. A, *Pectinariophyes reticulata* Spgbg. ♀, holotype; B, *P. stalii* Spgbg. normal ♀ (♀ holotype of *aequalior* Kirk.); C, same, intersex; D, *P. notanda* Dist. ♀, paratype; E, *P. luzonensis* Bkr. ♀, lectallotype; F, *P. basicostalis* Maa ♂, holotype; G, *P. hyalinipennis* Stål ♀, Natal Sea Park; H, *Aecalus pembertoni* Maa ♀, paratype; I, *Chaetophyes lubricans* Maa ♂, holotype; J, *Ch. kukukukui* Maa ♂, holotype; K, *Ch. bloetei* Maa ♀, holotype; L, *Ch. admittens* Wk. ♀, neallotype (see also Fig. 29B); M, *Ch. compacta* Wk. ♀, Lake Clairs; N, *Ch. vicina* Lall. ♀, Pentland; O, *Hindola* (*Hindola*) *apicalis* Maa ♀, holotype; P, *H.* (*H.*) *pahangana* Lall. ♂, topotype. Photographs not in same magnification.

tylus together with 11 hairy whitish transverse lines at each side; median line of postclypeus narrowly black. Side piece of vertex whitish. Scutellum greenish white at lateral stripe, yellowish white at postero-inferior margin (upper 1/2 fuscous) and at basidorsal spot of posterior process; fuscous at rim of sulcus (posterior 1/2) and basidorsal carina of process; lateral stripe rather short, almost straight and evenly broad. Tegmen colorless; veins at basal 1/2 almost entirely colorless, with 3–4 brownish granules; those at apical 1/2 fuscous; costal and anal margins and base of R-stem black to fuscous; corium apically narrowly fuscous. Legs brown; hind tibia largely yellow. Abdomen black; dorso-medially yellow, tergite 4 laterally whitish.

Postclypeus smooth, lacking median carina. Crown anteriorly broadly rounded. Tylus evenly convex; side piece of vertex hardly depressed; occipital margin slightly reflexed; tentorial pit transverse, moderately shallow; ocellar area descending forward. Pronotum strongly punctate-reticulate, meshes at discal area distinctly broader than rims; median carina distinct at anterior 2/3; anterior area at side of median carina strongly descending laterad; lateral angle broadly rounded, lacking oblique ental carina, not reaching level of basal sclerites of closed tegmen; anterolateral margin rounded-off at anterior 1/2, weakly reflexed at posterior 1/2; posterolateral submarginal area very narrowly depressed; posterolateral angle acuminate, strongly protruding caudoventrad. Scutellum more coarsely sculptured than pronotum, apical 3/4 with a weak median carina; sulcus 1/2 as long as scutellum, rather shallow, its rim explanate; lateral surface sharply reticulate, depressed below rim of sulcus. Discoidal cell of tegmen smooth, and length to width 14 : 5; apical cells weakly wrinkled. Body length 4.8–6.2 mm, to apex of scutellar process 6.1–7.0.

THAILAND: Holotype ♂ (BISHOP 3227), Chiangdao, 450 m, Chiangmai Prov., 5–11. IV. 1958, Maa. Paratypes, 2 ♂♂ (BKK), Chiangmai, 8. VIII. 1937.

This species stands near *M. notoceras* and *M. spangbergii* and is mainly characterized by the short scutellar sulcus, longer lateral scutellar stripe, dark tegminal veins, etc. The claval vein of the type series is apically forked at both sides. The holotype is much smaller than the ♂ paratypes.

Machaerota coomani Lallemand Figs. 22 F, J, S, 28L.

Machaerota coomani Lall. 1945: 428.—Maa 1949: 18, figs. 5–6, ♂♀ (redescr., variation, syn.).

Machaerota confirtissima Maa 1949: 18 (nom. nud.).

M. notoceras, Metcalf & Horton 1934: 425, figs. 119 & 124, ♂ (misidentification; Hainan).

Color pattern rather similar to that in *M. spangbergii*, size smaller, pronotum and scutellum speckled with brown or black, but tegmen lacking apical brown fascia. Head anteriorly broadly rounded. Postclypeus evenly convex, with no trace of a keel. Pronotum not so deeply and densely punctate as in *spangbergii*, transverse rims much wider than longitudinal ones, those at discal area mostly wider than punctural diameter; posterolateral margin proportionally longer and more incurved than in *spangbergii*; scutellar sulcus shallower and broader than in the latter species, narrowed caudad and somewhat similar to that of *M. luzonensis*, but shorter. Further characters similar to *spangbergii*.

MATERIAL EXAMINED: HAINAN: 1♀ (CAS), Nodoa, 10.VII.1935, Gressitt; 8♂♂, 5 ♀♀ (BMNH), same, but 30. VI, 10. VII, and 13. VII. 1935; 7 ♂♂, 5 ♀♀ (BMNH), Ta Hau, 3–8. VII. 1935, Gressitt; 1♂ (BMNH), Ta Hian, 15. VI. 1935, Gressitt. TONKIN: 1

♀ (BRN), Chiem-Hoa, Central Tonkin, VIII–IX, H. Fruhstorfer, labeled by L. Melichar as "*tonkinensis* n. sp."; 1♂ (WSW), "China and Hanoi", 25. VI. 1959, P. Pisarski & J. Proszynski; 1 ♀ (BMNH, paratype), Hoa Binh. VIETNAM: 1 ♀ (BISHOP), Ban-Me-Thout, 550 m, 16–18. V. 1960, L. W. Quate; 1 ♀ (BISHOP), Pleiku, 40 km SW, 300 m, 11. V. 1960, Quate; 1♀ (BISHOP), Di Linh (Djiring), 9 km S, 25.IV.1960, Quate; 1♀ (BISHOP), Dalat, 20 km S, 1300 m, 12. IX. 1960, Gressitt; 4 ♂♂ (BISHOP), Dai Lanh, N of Nha Trang, 30. XI–5. XII. 1960, C. M. Yoshimoto; 2♀♀ (BISHOP), Postal le M'Drak, 13 km W, 400 m, 10. XII. 1960, Yoshimoto; 1♀ (BISHOP), Phan Rang, 55 km NW, 8–16. XI. 1960, Yoshimoto.

Machaerota brunnipes (E. Schmidt), n. comb. Figs. 22 C, H, T, 27L.

Conmachaerota brunnipes E. Schmt. 1919: 373, ♂.

Female (undescribed): Head rather short, broadly rounded both in dorsal and lateral views. Anteclypeus reddish brown, concolorous with legs; postclypeus shining black, not keeled, its lateral pale lines hardly definable except by presence of hairs; upper part of pleurostome much narrower than basal antennal segment. Crown paler than postclypeus and pronotum; tylus feebly convex, slightly higher than side piece of vertex; ocelli distinctly closer to eyes than to each other; occipital margin parallel to transverse frontal suture, reflexed behind each tentorial pit. Pronotum rather densely haired; ratio of length and breadth 27 : 37; median carina rather strong at anterior 1/2, obscure at other 1/2; surface punctate-reticulate, reticulation-meshes mostly broader than long, with transverse rims distinctly higher and broader than longitudinal ones; lateral angle reaching level of basal sclerites of closed tegmen, lacking oblique ental carina; posterolateral angle acute, hardly projecting; anterolateral margin longer than posterolateral margin which is very narrowly explanate; posterior margin hardly sinuate. Scutellum more coarsely sculptured than pronotum; basidorsal area gently descending laterad; sulcus quite shallow, strongly sculptured, slightly longer than 1/2 of scutellum, and broader than interocellar distance; median carina complete, but weak; lateral stripe straight, about 2/5 or 3/7 as long as scutellum, scarcely narrowed apicad; rim of sulcus not explanate; lateral surface depressed; superior margin in profile nearly straight. Scutellar process rather short, gently arched, hardly longer than scutellum proper. Tegmen weakly wrinkled at discoidal and apical cells; length to width of discoidal cell 19 : 7. Relative breadths of head, pronotum and scutellum 23.5 : 37 : 19. Body length 6.0 mm, to apex of scutellar process, same.

Male: Similar, not noticeably darker. Body length 5.4 mm, to apex of scutellar process 5.7.

MATERIAL EXAMINED: THAILAND: Neallotype ♀ (BKK), Sanmahaphon Distr., 300 m, Chiangmai, 19. VI. 1936, M. R. Chakratong; 1 ♂ (BKK), same data; 1 ♀ (TCM, ex coll. M. Kato), Nakon Paton, 31. III. 1940, R. Takahashi.

This species is heretofore known from the unique type which was probably destroyed. It was from Lower Burma: Pegu (Palon) and was originally deposited in the Stettin Museum, but Dr. Nast (of Warsaw Museum) was unable to locate it. The Thailand specimens at hand well fit the original description and there seems to be no doubt regarding their identity. The color pattern is however slightly different. The pronotum is uniformly dark castaneous in both sexes, instead of anteriorly black brown and posteriorly reddish brown as described by the author; the scutellar process is yellowish or reddish brown, not "gelblichweiss." The single ♀ from Nakon Paton is much paler, and its pro-

notum is partly yellow along posterolateral margin and on reticulation-rims. The claval vein is apically branched at both sides in the ♀ from Chiangmai; branched at one side and simple at another in the remaining 2 specimens.

It is interesting to note that in Chiangmai, this species and *M. elegans* were found together and because of the similarity in size and color, they are easily confused. The chief characteristics of the latter species are: Scutellum in profile with distinct "neck" region, much shorter than its process; scutellar sulcus deeper and narrower; head proportionally longer.

Machaerota discreta (E. Schmidt), n. comb. Fig. 27M.

Conmachaerota discreta E. Schmt. 1919: 372, ♀.
Machaerota incerta Lallemand 1927: 100, ♀. **New Synonymy.**

Male: Castaneous. Postclypeus medially black at upper 1/2, laterally with 10 (incl. 2 or 3 on tylus) broad yellow hairy transverse lines; lorum and side piece of vertex largely yellow. Lateral angle of pronotum slightly darker. Scutellum yellow on lateral stripe, postero-inferior margin and anterior 1/2 of rim of sulcus; rim of sulcus with 4–5 brown spots on outer surface; lateral stripe 2/5 as long as scutellum, apically upcurving and nearly reaching rim of sulcus; scutellar process bright reddish brown, its basidorsal carina with obscure yellow spot near base. Tegmen blackish brown at extreme base and along anal margin and basal 1/3 of costal margin, colorless at middle, pale yellowish at apical area including corial appendix; veins slightly darker than ground color, with minute brown setigerous punctures. Hind tibia largely yellow. Abdomen black, tergites marked with yellow.

Crown moderately long, anteriorly broadly rounded. Postclypeus evenly convex, lacking any trace of a keel. Tylus flattened, weakly impressed along median line, gently descending at all sides; side piece of vertex plane, less raised than neighboring area of tylus; tentorial pit deep, suture-like, curving and reaching frontal suture; ocellar area strongly descending forward; occipital margin reflexed throughout, subangulately sinuate at middle. Pronotum reticulate, with some intermingling roundish punctures, meshes deep, rims at discal area mostly 1/2 as broad as meshes; median carina moderately strong at anterior 1/2, weak at another 1/2; lateral angle rounded, reaching level of basal sclerites of closed tegmen, its oblique ental carina weak; antero- and posterolateral margins both narrowly explanate, former much longer than latter; posterolateral angle acute, slightly projecting; posterior margin shallowly sinuate at middle. Scutellum rather shallow and lacking distinct "neck" region in profile; median carina hardly definable at base, becoming rather strong on joining basidorsal carina of scutellar process; sulcus rather evenly broad, 3/5 as long as scutellum, strongly wrinkled, its rim slightly explanate. Scutellar process strongly arched. Tegmen smooth, not wrinkled at discoidal and apical cells, length to width of the former 19 : 6 (much longer than maximum breadth of apical cell 3). Body length 5.5 mm, to apex of scutellar process 5.8; tegmen 4.5 mm long, 1.2 broad.

Female: Similar to ♂, slightly paler. Body length 6.3–6.7 mm.

MATERIAL EXAMINED: TENASSERIM: 1 ♀ (WSW, holotype of *discreta*), no further details; 1 ♀ (BMNH, originally paratype of *flavolineata* Dist.), Myitta, coll. Doherty.

THAILAND: Neallotype ♂ (BISHOP 3226), 1 ♀ (WN), Kamburi, W. Thailand, IV,

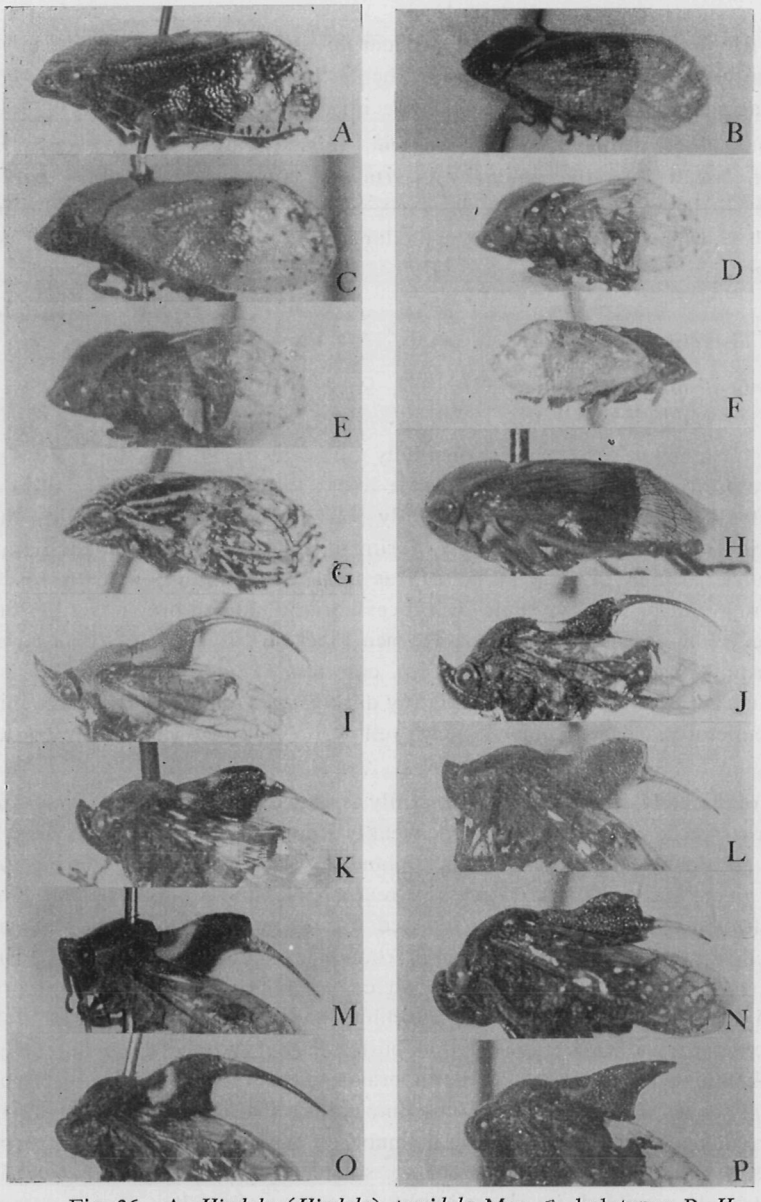

Fig. 26. A, *Hindola* (*Hindola*) *tumidula* Maa ♂, holotype; B, *H.* (*H*). *viridicans* Stål ♀, Penang; C, *H.* (*H.*) *taiwana* Kato ♀ holotype; D, *H.* (*H.*) *nitida* Bkr. ♀, syntype; E, *H.* (*H.*) *striata* Maa ♀, holotype; F, *H.* (*H.*) *fulva* Bkr. ♀, syntype; G, *H.* (*Platycotta*) *prostrata* Maa ♀, holotype; H, *Labrosyne longipes* Maa ♀, holotype; I, *Sigmasoma borneense* Bkr. ♀, syntype; J, *Grypomachaerota turbinata* E. Schmt. ♀, Kiau; K, *Platymachaerota gressitti* Maa ♀, allotype; L, *Tapinacaena sigmatoides* Maa ♂, holotype; M, *T. rotundata* Maa ♀, holotype; N, *Blastacaena rugiceps* Maa ♂, holotype; O, *Machaerota humboldti* Lall. ♀, Hollandia; P, *M. woodlarki* Maa ♂, holotype. Photographs not in same maginfication.

H. Fruhstorfer; 1 ♀ (BMNH, holotype of *incerta* Lall.), Mabeh Jalor, Peninsular Thailand, 23. VII. 1901, Annandale & Robinson.

The 2 Kamburi specimens differ slightly from the type specimen from Tenasserim. Their size is a trifle smaller, claval vein simple at both sides (forked at both sides in the type), posterolateral margin of pronotum nearly straight (concavely curved in type), lateral angles of pronotum protruding slightly beyond level of basal sclerites of tegmina, and scutellar sulcus deeper. However, they are apparently conspecific with the type. The left tegmen in the Thailand ♀ specimens has a short oblique supernumerary crossvein joining rm_1 and discoidal cell—a case of abnormality also found in *M. takeuchii*. In the type of *M. incerta* Lall., as labelled on the specimen and mentioned in its original description, the claval vein is forked at left side and simple at right.

Machaerota exaggerata Maa

Machaerota exaggerata Maa 1949: 22, fig. 8, ♂♀. Type, Tonkin: Hoa-Binh (TCM).

Easily distinguishable by the shape of the scutellum which is somewhat similar to that of *M. finitima* Jac. of Australia. Its true relatives are probably *M. subnasuta* and *M. philippinensis* Bkr.

Machaerota coronata (Maa), n. comb.

Conmachaerota coronata Maa 1947: 16 & 24, pl. (8, 10–12), ♂. Type, Fukien: Shaowu (Tachulan) (TCM).

Female (undescribed): Body densely haired. Postclypeus black. Crown and antecallus area of pronotum dark chestnut brown; major part of pronotum and scutellum as well, brownish with irregular indistinct dirty-yellow speckles; lateral pronotal margin narrowly yellow. Lateral stripe of scutellum not definable; postero-inferior margin ivory white; posterior process uniformly yellowish brown. Dorsum of hind tibia yellow.

Postclypeus weakly convex, not keeled. Tylus rather flattened, anteriorly very broadly rounded, almost truncated; side piece of vertex depressed, slightly less raised than tylus; tentorial pit roundish, shallow; ocellar area scarcely shorter than interocellar distance, weakly convex; occipital margin gently curved and reflexed. Pronotum weakly convex, length to width 7 : 10; median carina weak and at both ends, scarcely recognizable; anterolateral margin slightly longer than posterolateral margin; lateral angle broadly rounded, reaching level of basal sclerites of closed tegmen; oblique ental carina absent; lateral ampliation very narrow; posterolateral angle acute, not protruding. Scutellum with a faint complete median carina; basidorsal area weakly flattened; sulcus very shallow, almost 1/2 as long as scutellum, weakly narrowed apicad, at middle about as wide as interocellar distance; lateral surface feebly depressed, slightly exposed at sides of sulcus in dorsal view; rim of sulcus not explanate. Basidorsal carina of scutellar process entering posterior 1/3 of sulcus. Tegmen wrinkled at apical cells; length to width of discoidal cell 10.5 : 4. Other characters as in original description for ♂. Body 4.7 mm long; tegmen 3.9 mm long, 1.3 wide.

MATERIAL EXAMINED: KWANGTUNG: Neallotype ♀ (USNM), Hongkong, on leaf of *Rhodomyrtus tomentosa*, IV. 1958, N. L. H. Krauss.

The flattened and broadly rounded tylus and quite shallow scutellar sulcus of *coronata* and *luzonensis* Bkr. are similar. But the latter species is much larger, its scutellum in profile is much deeper and with conspicuous lateral stripe.

Machaerota esakii Kato

Machaerota encifera (error for *ensifera*), Esaki 1932: 1716, fig. 3390 (misidentification) (Taiwan, no further details) (KU).

Machaerota esakii Kato 1939: 648 (n. name for *ensifera* Esaki not Burmeister).—Maa 1949: 21, fig. 7, ♀ (redescr.).

The type is unknown to me and my (*l. c.*) interpretation was based on Esaki's rather brief description. Metcalf (1960: 34) wrongly listed the species from Japan.

***Machaerota taiheisana** (Matsumura), n. comb.

Asichaerota taiheisana Matsum. 1940: 40, ♀. Type, Taiwan: Taiheizan (SPR).

This species is known from the unique type and probably is a synonym of *M. esakii* which has priority. The placing in the key is based upon its author's statement that it is related to *M. takeuchii*.

Machaerota fukienicola Maa

Machaerota fukienicola Maa 1947: 14 & 23, pls. 1 (4–6) & 2 (7–9), ♂♀. Type, Fukien: Shaowu (Tachulan) (TCM).

Allied to *M. formosana*, but different in lateral view of the head, scutellum and ♂ abdominal apex.

Machaerota formosana Kato Figs. 19Q, 23 D, H, M, N, 27N.

Machaerota formosana Kato 1928: 35, pl. 2 (6), ♂.

Machaerota extensa Maa 1956: 237, pls. 1 (5–6) & 2 (7–8), ♀. **New Synonymy.**

Male: Body almost uniformly pitchy black; face shining black; posterior 1/2 of pronotum, lateral surface of scutellum, scutellar process, venter of thorax, legs and abdomen tinted with castaneous; postclypeus and scutellar process lacking pale markings; lateral stripe and lower 1/2 of postero-inferior margin of scutellum yellow; the former straight, 1/3 as long as scutellum, posteriorly slightly narrowed; hind tibia not paler than other parts of legs. Tegmen almost clear hyaline, extreme apical margin and corial appendix brownish; veins all blackish brown, not superposed by brown granules.

Postclypeus micropunctate at side; its keel only faintly indicated near top. Crown moderately long, densely micropunctate; tylus depressed, anteriorly raised; transverse frontal suture strongly curved; side piece of vertex raised along antennal ledge and before tentorial pit, more raised than neighboring area of tylus; ocellar area descending forward and laterad; interocellar distance slightly greater than ocello-ocular distance; occipital margin strongly raised and angulately incised at middle; tentorial pit deep, suture-like, curving and extending to frontal suture. Pronotum fairly broad, sharply reticulate, lacking roundish punctures; median carina strong at middle, poorly defined at both ends; lateral angle broadly rounded, slightly surpassing level of basal sclerites of closed tegmen, its oblique ental carina strong, rather long; posterolateral angle also broadly rounded; anterolateral margin nearly straight; posterolateral margin distinctly incurved behind middle, broadly explanate; posterior margin straight. Scutellum lacking median carina, rather shallow and lacking "neck" region in profile; sulcus 2/3 as long as scutellum, very deep, strongly wrinkled, its rims nearly straight, slightly convergent caudad; basidorsal area less strongly descend-

ing laterad than in *takeuchii*. Scutellar process weakly arched, scarcely longer than superior scutellar margin in profile, its basidorsal carina hardly entering sulcus, evenly narrow. Tegmen smooth, not wrinkled at discoidal and apical cells, length to width of the former 12 : 5. Body length 5.0 mm, to apex of scutellar process 5.4; tegmen 4.1 mm long, 1.5 broad.

MATERIAL EXAMINED: TAIWAN: Holotype ♂ (TCM ex M. Kato coll.), Shishito nr. Horisha, 14. III. 1927. (Type of *extensa*, from Taiwan: Pianan nr. Taitung, is in author's coll.)

The claval vein in the holotype is simple at both sides. *M. formosana* is apparently related to *M. fukienicola* and *M. takeuchii*. It differs from the last species in having narrower pronotum, deeper scutellar sulcus and differently shaped scutellum. The species was wrongly listed by Metcalf (1960: 35) from Japan. *M. extensa* is here suppressed as a synonym following an examination of the type of *formosana*.

Machaerota flavolineata Distant Figs. 19R, 23 B, F, I, P, 28M.

Machaerota flavolineata Dist. 1907: 83.

Female: Head black; postclypeus laterally paler, with 7–8 short yellow transverse hairy lines; side piece of vertex yellow except its inner slope and posterior area. Pronotum brownish black; median carina, part of anterolateral margin and rims of reticulation at discal area often brownish yellow. Scutellum also brownish black; lateral stripe, anterior 1/3–2/3 of rim of sulcus, lower 1/2 of postero-inferior margin and basal spot of posterior process all yellow; lateral stripe broad, straight, not more than 1/3 as long as scutellum; scutellar process uniformly castaneous. Tegmen yellowish; brownish black at extreme base, along anal margin and basal 1/3 of costal margin; veins hardly darker than ground color, with scattered brown granules which are as wide as veins (no such granules on clavus). Legs including hind tibia brownish black, tarsi slightly paler. Abdomen black; yellow along dorsomedian line, on tergite 3 as a whole and on lateral area of 4.

Postclypeus evenly convex, minutely punctate, not keeled. Crown thinly haired, tylus convex or slightly flattened, irregularly rugose; side piece of vertex weakly flattened, distinctly less raised than tylus, with a weak transverse impressed line at middle; tentorial pit arcuate, deep; occipital margin angularly incised at middle, strongly reflexed behind each tentorial pit; ocellar area weakly descending forward; ocelli in contact with occipital margin, nearly equidistant from eyes and each other. Pronotum coarsely punctate reticulate, rims not sharp, transverse rims broader and higher than longitudinal ones, and at discal area mostly as wide as or wider than meshes; rims elsewhere much narrower than meshes; median carina moderately strong, weak at bot hends; ante-callus area thinly haired, rather finely punctate; lateral angle rounded, usually lacking distinct oblique ental carina, reaching level of basal sclerites of closed tegmen; anterior area at side of median carina strongly descending laterad; anterolateral margin weakly carinate at anterior 1/3, weakly reflexed at other 2/3; posterolateral submarginal area very narrowly depressed; posterolateral angle rounded, not protruding. Scutellum more coarsely and sharply sculptured than pronotum, fairly shallow in profile; median carina much stronger than in pronotum but not or hardly entering sulcus; sulcus 1/2 as long as scutellum, moderately deep; rims of sulcus high, narrow, straight, convergent caudad; lateral surface belowrim weakly de-

pressed, with punctural interspaces much wider than punctural diameter (other part of lateral surface sharply reticulate). Basidorsal carina of scutellar process scarcely entering sulcus, rather wide at both ends, strongly attenuate at middle. Tegmen moderately elongate; apex rounded; length to width of discoidal cell 22 : 8; cells all smooth, distinctly concave, not wrinkled. Relative breadths of head, pronotum and scutellum 21 : 37 : 20. Body length 7 mm.

Male: Similar, slightly darker. Body length 6.3–6.6 mm.

MATERIAL EXAMINED: BURMA: Holotype ♀ (BMNH), Karen Hills. VIETNAM: 1 ♂, 1 ♀ (BISHOP), Dalat, 1550 m, 11. IX. 1960, Gressitt; 1 ♂, 1 ♀ (BISHOP), 6 km S of Dalat, 12. IX. 1960, Gressitt. TENASSERIM: 1 ♀ (WN), Tandong, 1200 m, H. Fruhstorfer.

The scutellar sulcus of this species is somewhat variable in depth and sculpture. In the holotype and the couple from Dalat, it is fairly shallow and weakly narrowed apicad; in the 3 other specimens, deeper and strongly narrowed apicad; and in the ♀ from Tenasserim, smooth at bottom and lacking any trace of median carina thereon. Among the 6 specimens examined, the claval vein is simple at both tegmina in the holotype and 1♂, forked at both tegmina in another ♂ and forked at one side and simple at another in the 3 remaining ♀♀. The holotype is 7.5 mm long and is slightly larger than other specimens examined. The paratype ♀ is referable to *M. discreta* E. Schmt. (*q. v.*).

Machaerota takeuchii Kato Figs. 23 A, E, J, L, Q, 27P.

Machaerota takeuchii Kato 1931: 60, fig. 1, ♀. Type, Honshu: Mt. Ryozen (Omi) (MKT). Wrongly spelled by Kato (1952: 38) as *takeunsphci*, and by Esaki (1950: 271) as *takeushii*.

Asichaerota takeuchii, Matsumura 1940: 81 (list).

Male: Body shining black, with silvery hairs. Postclypeus smooth, not keeled, laterally with about 8 impressed hairy transverse lines. Tylus convex, finely, concentrically wrinkled, descending caudad; side piece of vertex finely punctate, almost plane; antennal ledge slightly reflexed; lateral and transverse frontal sutures moderately deep; ocellar area low; occipital margin reflexed, shallowly sinuate at middle. Pronotum sharply punctate-reticulate, with meshes mostly more than 2× as wide as rims; calli roundish; anterior area at side of median carina weakly descending laterad; median carina complete, stronger at anterior 2/3; anterolateral margin almost straight, longer than posterolateral margin; lateral submarginal area rather broadly depressed; lateral angle rounded, extending to or slightly beyond level of basal sclerites of closed tegmen, with strong oblique ental carina; posterolateral angle rounded, not projecting out. Scutellum with ordinary yellow markings, more coarsely and deeply sculptured than pronotum; sulcus rather shallow, narrowed caudad, about 3/5 as long as scutellum; basidorsal area strongly descending laterad at each side of median line; median carina weak at both ends, fairly strong at intermediate 1/3; lateral stripe 1/2 as long as scutellum, gently upcurved. Scutellar process weakly arched, apically reaching level of tegminal apices; its basidorsal carina hardly entering sulcus. Tegmen richly stained with yellow; discoidal and apical cells smooth and not wrinkled, length to width of the former 24 : 10; veins largely brown, becoming paler toward tegminal apex; anal margin and basal 1/2 of costal margin blackish brown. Legs including hind tibia hardly paler than body proper. Abdominal tergites medially yellow. Body length 6.7–7.1 mm.

Female: Similar, not noticeably paler. Body length 8 mm.

HOST PLANT: *Tilia japonica* Simk. (Tiliaceae).

MATERIAL EXAMINED: HONSHU: 1 ♂, 1 ♀ (USNM), Takashi-nojyo, Tokyo, 20. V. 1951, H. Hasegawa; 2 ♂♂ (TCM), Todari, nr. Asakawa, 19. VI. 1937, M. & M. Kato. SHIKOKU: 1 ♂ (TCM), Mt. Tsurugi, 3. VI. 1957, T. Kobayashi. KYUSHU: 2♂♂, 1♀ (KU), Ukiha (Chikugo), 11. V. 1954, N. Gyotoku.

The claval vein in all the specimens examined is simple. In the ♂ from Shikoku, both wings have a supernumerary apical branch from longitudinal vein 1. On the other hand, the discoidal cell of both tegmina in 1 ♂ from Todari and 1 ♀ from Takashi-nojyo has an appendiculate cell anteriorly. In the latter specimen, there is, furthermore, a short supernumerary crossvein joining the appendiculate cell and rm_1—a case which reminds me of one of the "characters" of *Eumachaerota* and *Asichaerota*.

This is a fairly distinct species and can unmistakeably be recognized by the following combination of characters: Pronotum broadly explanate along lateral margin, but broadly rounded at posterolateral angle and not laminate at lateral angle; scutellum strongly descending laterad at basidorsal area and with very shallow sulcus; tylus convex; discoidal cell of tegmen short; etc. Its occurrence in S. Japan marks the northernmost distributional range of the subfamily. Metcalf (1960: 39) wrongly listed the species from Taiwan.

KEY TO MACHAEROTA SPECIES OF INDIAN AND CEYLONESE SUBREGIONS

(Not including *M. ensifera* Burm.=*M. ensiferina* E. Schmt. which was wrongly recorded as from Silhet by Signoret 1879)

1. Head, in dorsal and lateral views, strongly produced forward into a horizontal, conical process; scutellum lacking lateral stripe and with profile depth greater than length along lateroventral margin ..... **punctatonervosa**
   Head of normal shape and length, with crown anteriorly broadly rounded, not forming conical process; scutellum with distinct lateral stripe, and with profile depth much smaller than length along laterovental margin 2
2. Lateral stripe strongly curved, about 1/2 as long as scutellum; apical cells of tegmen smooth, concave, not wrinkled, not with brown marking except ordinary granules on veins; rim of scutellar sulcus not shorter than postero-inferior margin (see under enumeration of Malaysian species) ..... **andamanensis**
   Lateral stripe straight along its upper margin, rarely 1/2 as long as scutellum, usually much shorter; apical cells of tegmen wrinkled and/or with distinct brown marking other than granules on veins 3
3. Tylus as long as or longer than wide (when viewed vertically to crown); posterolateral pronotal angle spine-like, protruding out; tegmen usually with evenly narrow brown fascia along inner side of apical ambient vein, all apical cells distinctly wrinkled ..... **spangbergii**
   Tylus markedly wider than long when viewed vertically to crown; posterolateral pronotal angle not protruding out like spine; tegmen either without apical brown marking other than granules on veins, or, the marking more extensive, covering whole apical cell 1 and extending to extreme apex of tegmen; apical cells concave, not wrinkled 4
4. Scutellum not highly arched, hence rim of sulcus distinctly longer than postero-

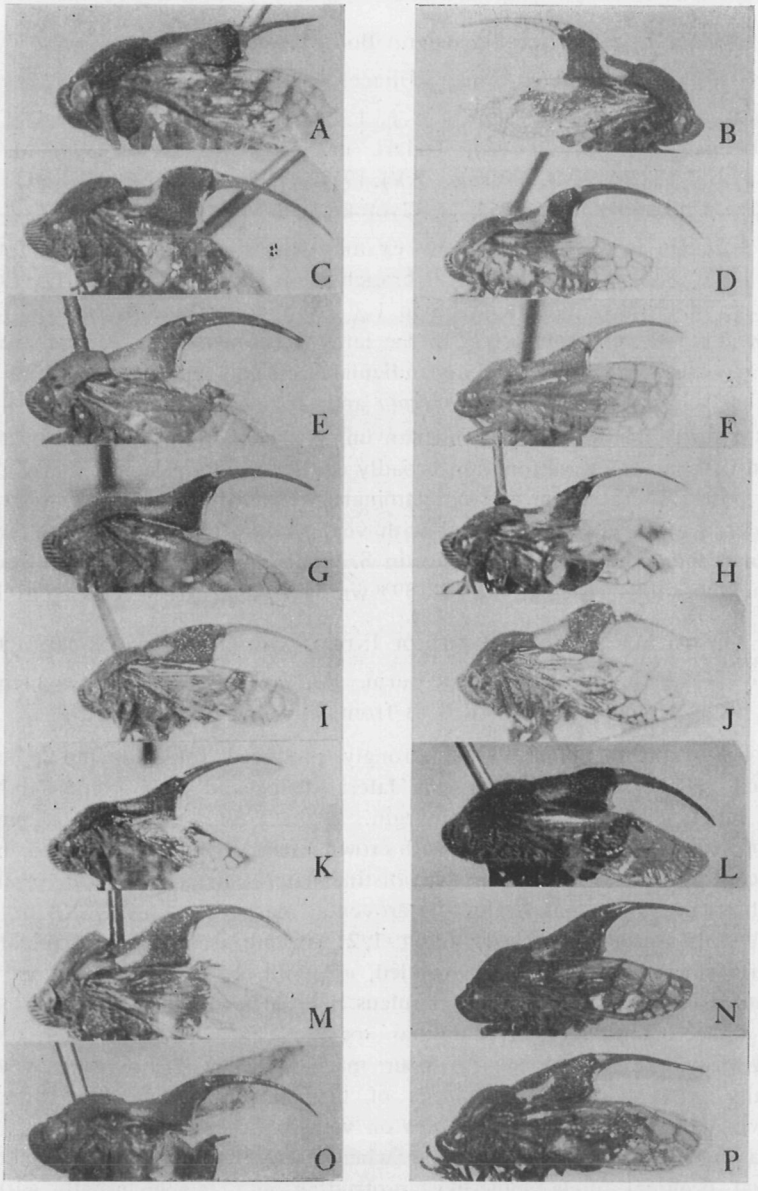

Fig. 27. A, *Machaerota pugionata* Stål ♀, Kimberley; B, *M. mindanaensis* Bkr. ♀, syntype; C, *M. philippinensis* Bkr. ♀, *ex* Semper coll.; D, *M. longiscutata* Maa ♂, holotype; E, *M. confusa* Maa ♀, holotype; F, *M. ensifera* Burm. ♀, Davao *ex* Baker coll. (as "*luzonensis*"); G, *M. notoceras* E. Schmt. ♀, Penang; H, *M. signatipennis* Maa ♀, allotype; I, *M. luzonensis* E. Schmt. ♀, Medan *ex* E. Schmidt coll.; J. *M. subnasuta* Maa ♂, neallotype; K, *M. elegans* Maa ♂, holotype; L, *M. brunnipes* E. Schmt. ♀, neallotype; M, *M. discreta* Dist. ♀, W. Thailand; N, *M. formosana* Kato ♂, holotype; O, *M. spangbergii* Sign. ♀, holotype; P, *M. takeuchii* Kato ♀, Tokyo. Photographs not in same magnification.

inferior margin and "neck" region in profile more than 1.5× as long as deep; tegmen lacking any apical brown marking other than granules on veins..... **pandata**

Scutellum highly arched, hence rim of sulcus not or hardly longer than postero-inferior margin; "neck" region about as long as deep in profile..... **assamensis**

Machaerota spangbergii Signoret Figs. 19S, 23 C, G, O, 27O.

Machaerota spångbergii Sign. 1879: 48, ♀.

Machaerota punctulata Sign. 1879: 49, ♀. **New Synonymy.**

M. planitiae Distant 1907: 84. **New Synonymy.** Wrongly spelled by Ayyar (1940: 4767) as *planitae.*

M. noctua Dist. 1916: 183, fig. 140. **New Synonymy.**

Conmachaerota spangbergi (sic), E. Schmidt 1919: 372 (list).

Machaerota noctua+*M. planitiae* (p. 37)+*M. punctulata* (p. 38)+*Conmachaerota spångbergi*, Metcalf 1960: 37, 38, 42.

Female: Dirty brown yellow. Postclypeus medially black, laterally with 12 (incl. 3 on tylus) brownish black transverse impressed lines which are more or less narrower than interspacing hair lines; anteclypeus and pleurostome brownish black; tentorial pit brownish black. Pronotum with a broad brown line along anterolateral margin and with about 30 brown spots which are mostly transverse and about as large as calli; punctures brown, darker than ground color. Scutellum brown, posteriorly darker; lateral stripe yellow, very short, subtriangular; postero-inferior margin also yellow; median area at base with rims of reticulation brownish yellow; rim of sulcus with a few large black spots. Scutellar process dark castaneous, with some very small indistinct black spots, its basidorsal carina basally yellow. Tegmen pale yellowish, stained with brown at both sides of apical marginal vein; anal margin and basal 1/3 of costal margin brownish black; veins yellow, with a few superposing brown spots which are about as wide as veins. Legs brownish black; hind tibia yellow except at both ends. Abdomen brownish black, tergite 3 and median line of 4–8 yellow.

Head roundly produced forwards. Postclypeus not keeled. Crown thickly haired, microsculptured; tylus longer than wide, gently, evenly convex; side piece of vertex hardly depressed; supra-antennal triangle distinctly lower than tylus; tentorial pit transverse, moderately deep; ocellar area rather strongly descending forwards; occipital margin weakly reflexed, weakly sinuate at middle. Pronotum moderately convex, deeply, coarsely punctate-reticulate; transverse rims mostly much higher and broader than longitudinal ones and at discal area about as broad as meshes; ante-callus area thickly haired, finely punctate; median carina strong, but much weaker at both ends; lateral angle rounded, with a short weak oblique ental carina, about reaching level of basal sclerites of closed tegmen; anterolateral margin weakly carinate at anterior 1/3, hardly reflexed at posterior 2/3; posterolateral marginal area very narrowly depressed; posterolateral angle acuminate, protruding ventro-caudad. Scutellum very coarsely reticulate and distinctly longitudinally convex at basidorsal area; median carina weak but distinct at apical 3/4; lateral surface sharply reticulate; sulcus deep, 3/5 as long as scutellum, narrower than interocellar distance, its rim slightly explanate; area below rim depressed; scutellar process moderately long. Tegmen elongate, apex acute; length to width of discoidal cell 18: 6; apical cells irregularly wrinkled, hardly depressed. Body length 6.0–6.7 mm.

Male: Similar, more or less darker. Pronotum with larger and more numerous brown markings; scutellum castaneous, basidorsally with some black spots; lateral stripe slightly longer. Tylus slightly shorter. Sub-anal lobe of pygofer acute, long, slender. Body length 5.5 mm.

HOST PLANTS: *Zizyphus jujuba* (Rhamnaceae), *Aegle marmelos* (Rutaceae).

PARASITE: *Eupelmus tachardiae* Howard (Hym., Eupelmatidae).

MATERIAL EXAMINED: INDIA: 1 ♀ (WN, holotype of *spangbergii*), "Silhet"; 1 ♂, 1 ♀ (WN, syntypes of *punctulata*), "Silhet"; 1 ♀ (BMNH, holotype of *noctua*), Pusa, Bihar; 1 ♀ (BMNH, holotype of *planitiae*), Pusa, H. M. Lefroy; 1 ♀ (BMNH, paratype of *planitiae*), same data; 1 ♀ (BMNH), Pusa on *Zizyphus jujuba*, 5. IX. 1914, C. S. Misra; 1 ♂ (BMNH, paratype of *noctua*), Pusa, on "Ber", 16. IX. 1914, D. P. S.; 1 ♂, 1 ♀ (BMNH), Waltair, Madras Presidency, 22. IV. 1910, S. W. Kemp; 1 ♀ (BMNH), Calcutta, Bengal, on *Zizyphus jujuba*, F. W. Gravely; 4 ♀♀ (BMNH, DHD), Malhan, Dehra Dun, United Prov., 21. IV. 1929, Sher Bahadur; 1♀ (DHD), New Forest, Dehra Dun, on *Zizyphus* by sweeping, VIII. 1948, N. C. Chatterjee; 1 ♀ (AMNH), Kanchrapara, Bengal, 28. V. 1944, M. A. Cazier; 5 ♀♀ (CCT), Hashiapur, Punjab, IV. 1959, G. P. Sarma; 2 ♂♂ (BMNH), "Ind.", bearing W. L. Distant's handwritten label "*spanbergi* [sic] Sign.?".

The last 2 specimens are certainly those mentioned in Distant's work (1907: 82). To avoid confusion, the ♂ syntype of *punctulata* is here selected as the lectotype of that "species." *M. spangbergii* appears to be widely distributed in the lowland of northern Peninsular India. Its occurrence in Sylhet, type locality of both *spangbergii* and *punctulata*, however needs confirmation. Under *planitiae*, Metcalf (1960: 37) wrongly included Taiwan within the range of its distribution.

This species is allied to *M. notoceras* of Malaysia. The claval vein in all specimens examined is apically branched at both sides. E. Schmidt (1907: 187) however placed *spangbergii* in his group with simple claval vein, and *punctulata* in group with forked claval vein. The same author (1907: 194) also wrongly cited the original spelling as *spangenbergii*.

A direct comparison of the types of *spangbergii*, *punctulata* and *noctua* and an authentical specimen of *planitiae* convinced me that the apparent differences given in their original descriptions merely represent individual (degree of maturity) and sexual variations of one species. By the "page priority", I am selecting *spangbergii* as the correct name of this species, although the type of *spangbergii* is unique and a rather teneral ♀ and its pronotal speckles and apical tegminal fascia are obscure and can be seen only under certain light.

The following odd specimens at the British Mus. (Nat. Hist.) are left out unnamed: 1 ♀, Trivandoun, V. 1955, A. P. Mathew; 1 ♂, Mazbat, Mangaldai Distr., Assam, X. 1910, S. W. Kemp. By geographical reasons, these may be referred to *pandata* and *assamensis* respectively, but they are rather different from typical specimens of the 2 species. Whether such differences are constant or merely individual variation can only be decided with the aid of further material.

Machaerota pandata Distant

Machaerota pandata Dist. 1916: 184.

Female: Slightly darker than *spangbergii*, but tegmen with richer yellowish tints and lacking apical brown fascia. Lateral stripe of scutellum straight, horizontal, only about 2.5× as long as wide. Head much shorter than in *spangbergii*; tylus distinctly wider than

long, anteriorly very broadly rounded; ocelli slightly closer to eyes than to each other. Anterolateral margin of pronotum scarcely sinuate (virtually straight in holotype); posterolateral angle not protruding out as spine. Scutellum very broadly flattened at basidorsal

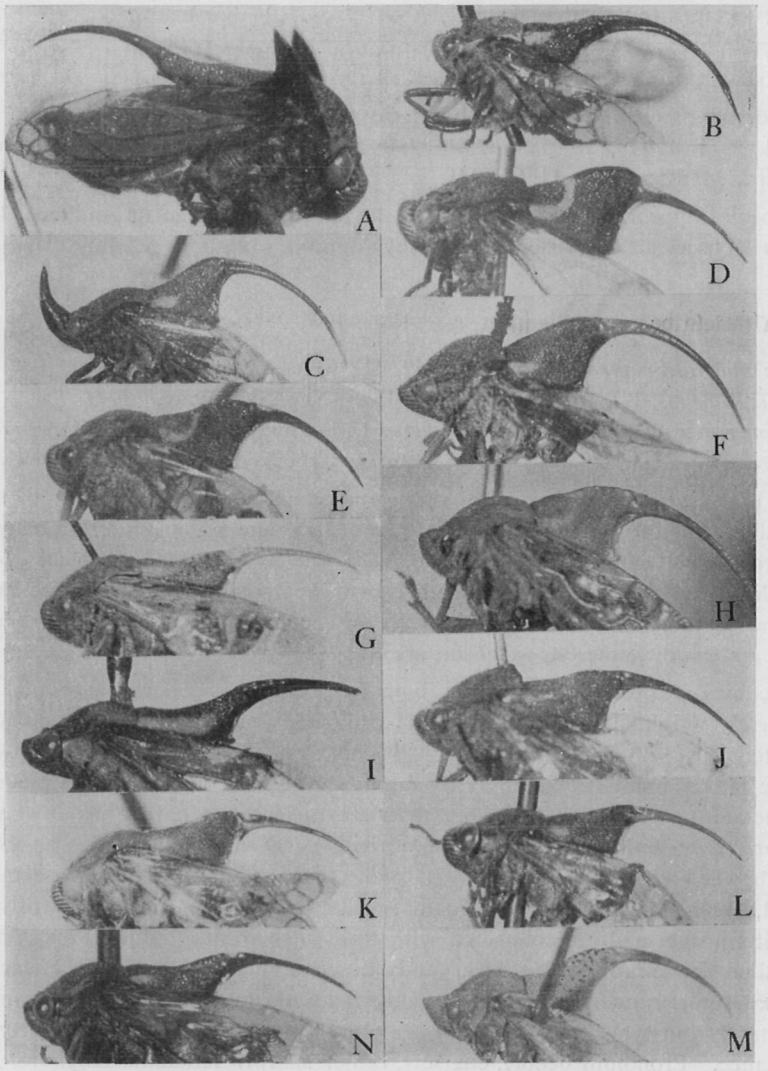

Fig. 28. A, *Maxudea crassiventris* E. Schmt. ♀, Sumatra; B, *Romachaeta brachynotum* Maa ♂, holotype; C, *Sigmasoma chakratongi* Maa ♂, holotype; D, *Machaerota finitima* Jac. ♀, holotype; E, *M. ampliata* Maa ♀, holotype; F, *M. moluccana* Kirk. ♀, holotype; G, *M. rastrata* Wk. ♀, Rama Mesa, Flores (topotype); H, *M. convexa* Maa ♀, holotype; I, *M. fusca* Bkr. ♀, syntype; J, *M. latior* Maa ♀, allotype; K, *M. assamensis* Dist. ♀, topotype; L, *M. coomani* Lall. ♀, Nodoa, Hainan; M, *M. flavolineata* Dist. ♀, Vietnam; N, *M. punctatonervosa* Sign. ♀, holotype. Photographs not in same magnification.

area between lateral stripes and therefrom suddenly descending lateroventrad; sulcus about as wide as interocellar distance. Apical cells of tegmen not wrinkled. Other characters as in *spangbergii*. Body length 6 mm.

Male: Slightly smaller and darker, otherwise similar to ♀. Sub-anal lobe of pygofer broader but less protruding than in *spangbergii* (genitalia not examined).

MATERIAL EXAMINED: S. INDIA: Holotype ♀ (BMNH), Nilgiri Hills; 1 ♂, 1 ♀ (BMNH), Naraikkadu, 800–900 m, Tinnevelly Distr., 12. III. 1936, B. M.-C. M. 1936, S. India Exped.; 1 ♂ (BMNH), Parambikulam, 600–1000 m, Cochin State, IX. 1914, F. H. Gravely; 1 ♂ (BMNH), Matheran, Bombay Pres.; 1 ♂, 1 ♀ (DHD), Kottur, 1200 m, Vellore Distr., Madras Pres., 11. II. 1931.

This species appears to be restricted to the submontane area of southern India. The "*M. noctua*" observed and reported upon by Mathew (1956) is possibly referable here.

Machaerota punctatonervosa Signoret Figs. 19T, 28N.

Machaerota punctato-nervosa Sign. 1879: 49, ♀.
M. guttigera Westwood 1886: 332, pl. 8 (1–15). **New Synonymy.**
M. punctatonervosa+*Conmachaerota guttigera*, E. Schmidt 1919: 371 (list).

Female: Uniformly dirty ochraceous (Signoret wrote "jaune grisâtre" which is true only when under artificial light). Pronotum and scutellum with a number of small brown dots; scutellum lacking lateral stripe, its lateroventral and postero-inferior margins yellow; scutellar process yellow at basal 1/4, with very fine brown dots at apical 3/4. Tegmen hyaline, pale yellowish; veins yellow, with brown superposing spots which are about as wide as veins and as large as those on pronotum, but much smaller than those on scutellum, and are darker and more numerous at costal area.

Head conically produced forwards both in dorsal and lateral aspects. Anteclypeus feebly, coarsely wrinkled, its median carina prominent at middle, weakened towards both ends. Postclypeus with broad keel which becomes narrower and weaker on approaching lower end; lateral impressed lines fairly broad, indistinct. Lorum and pleurostome obliquely punctate-rugose, the latter wider than the former and hardly wider than length of gena proper. Crown thickly haired, weakly, irregularly wrinkled. Tylus as long as posterior breadth when viewed vertically to its plane, exceedingly strongly descending laterad and behind, anteriorly with broad median fovea. Side piece of vertex hardly depressed; tentorial pit transverse, deep, connected with transverse frontal suture through deep, oblique suture outside of ocellus; ocellar area gently descending laterad, slightly lower than transverse frontal suture; occipital margin weakly reflexed, angularly incised at middle; ocellus equidistant from tylus and occipital margin; interocellar distance nearly 2× ocello-ocular distance. Pronotum deeply, coarsely, rather sharply reticulate (Signoret wrote "très-finement ponctue"), with meshes mostly 3–4× as wide as rims at discal area, becoming still coarser and sharper near posterior pronotal margin; median carina narrow and rather high at anterior 3/4; ante-callus area finely punctate-reticulate; calli shallow; lateral angle broadly rounded, reaching level of basal sclerites of closed tegmen, lacking oblique ental carina; posterolateral angle acute, slightly protruding behind; anterolateral margin weakly carinate at anterior 1/3 and weakly reflexed at other 2/3; posterolateral submarginal area very narrowly depressed. Scutellum more coarsely reticulate than pronotum, no median ca-

rina; sulcus moderately deep, about 3/5 as long as scutellum, its rim hardly explanate; lateral surface below rim sharply reticulate, practically not depressed; basidorsal carina of scutellar process distinctly entering sulcus, posteriorly widened. Tegmen unusually elongate and apically acute; length to width of discoidal cell 19 : 8; apical cells strongly irregularly wrinkled. Hind femur and tibia relatively stouter than in related species. Relative breadths of head, pronotum and scutellum 24 : 36 : 19. Body length 6.75 mm, to abdominal apex 5.5, to postero-inferior angle of scutellum 3.9; tegmen 5.3 mm long. (Signoret gave 4 mm as body length).

DISTRIBUTION: Ceylon. Wrongly recorded from China and Java. Its occurrence in Peninsular India needs confirmation.

HOST PLANT: *Adansonia digitata* Linn. (Bombacaceae).

MATERIAL EXAMINED: CEYLON: 1♀ (OXF, type of *guttigera*). "SYLHET": 1♀ (WN, type of *punctatonervosa*) labelled (not in Signoret's hand-writing) as "*punctatinerv.*" and "Sylhet". The type is in fairly good condition, but the legs are mostly missing and the abdomen seriously damaged by some museum pest. The tegmen and wing at right side have been torn off and mounted on a separately pinned card.

This beautiful and unusual species can be unmistakably distinguished from all of its congeners by the shape of head, which strongly simulates that of the genus *Grypomachaerota*. The elongate and apically acute tegmen and its simpler apico-costal venation are also characteristic. The claval vein of the type is forked at both sides, although E. Schmidt (1907: 186) placed it in the group with simple claval veins. Metcalf's (1960: 36, 38) mistake in listing *punctatonervosa* and *guttigera* from Java stemmed from Melichar's (1914: 116). An examination of the specimens involved proves to be *rastrata* instead.

PHYLOGENETIC HYPOTHESIS

The phylogeny of the Machaerotidae has been little explored, and our knowledge of the family and its relatives is too meagre to reach a detailed definite conclusion. In the following pages, attempts are made to correlate the pertinent factors involved. This is done with the reservation that future knowledge of the family may necessitate modifications of the interpretations here presented.

The probable machaerotid ancestor appeared in the Tertiary subtropics and was derived from the Cercopidae. Since then they have changed little, and consequently the Recent Machaerotidae are very uniform in structure. In closely related forms, the distributional pattern and sexual dimorphism appear to be associated with their relative antiquity, and in certain respects, the habits and structures of the nymph seem to be of phylogenetic significance.

References on phylogeny of Machaerotidae

Bekker-Migdisova, H. F. 1946. Contributions to the knowledge of the comparative morphology of Recent and Permian Homoptera. Bull. Acad. Sci. URSS (Biol.) **1946** (6): 741–66, 25 figs. (Not seen).

———— 1948. Notes on the comparative morphology of Recent and Permian Homoptera. *Ibid.* **1948** (11): 123 et seq. (Not seen).

Carpenter, F. M. 1931. The Lower Permian insects of Kansas. Part 4. The order Hemi-

ptera, and additions to the Palaeodictyoptera and Protohymenoptera. Amer. Jour. Sci. ser. 5, **22**: 113–30, 8 figs.

———— 1933. The Lower Permian insects of Kansas. Part 6. Delopteridae, Protelytroptera, Plectoptera and a new collection of Protodonata, Odonata, Megasecoptera, Homoptera, and Psocoptera. Proc. Amer. Acad. Arts Sci. **68**: 411–503, 1 pl., 29 figs.

———— 1954. Key to extinct families of Insecta. Bull. Mus. Comp. Zool. Harvard Coll. **108**: 777–827, figs. 1122–1219.

Crampton, G. C. 1922. Evidences of relationship indicated by the venation of the fore wing of certain insects, with special reference to the Hemiptera-Homoptera. Psyche **29**: 23–41.

Evans, J. W. 1940. Tube-building cercopids (Homoptera, Machaerotidae). Trans. Roy. Soc. S. Austl. **64**: 70–75, 6 figs.

———— 1946. A natural classification of leaf-hoppers (Jassoidea, Homoptera). Part 1. External morphology and systematic position. Trans. Ent. Soc. Lond. **96**: 47–60, 25 figs.

———— 1948. Some observations on the classification of the Membracidae and on the ancestry, phylogeny and distribution of the Jassoidea. *Ibid.* **99**: 497–515, 10 figs.

Handlirsch, A. 1906–08. Die fossilen Insekten und die Phylogenie der rezenten Formen. 1430 pp., 51 pls. Leipzig.

———— 1937. Neue Untersuchungen über die fossilen Insekten mit Ergänzungen und Nachträgen sowie Ausblicken auf phylogenetische, palaeogrographische und allgemein biologische Probleme. I. Teil. Ann. Naturhist. Mus. Wien **48**: 1–140.

———— 1939. Same. II. Teil. *Ibid.* **49**: 1–240, 16 pls.

Haupt, H. 1929. Neueinteilung der Homoptera-Cicadina nach phylogenetische zu wertenden Merkmalen. Zool. Jahrb. (Syst.) **58**: 173–286, 86 figs.

(A) Distributional Pattern

The machaerotids are almost entirely limited to the Palaeotropics. (They are replaced by the Clastopterinae [Cercopidae] in the Neotropics.) A conspicuous pattern is that a large proportion of genera and species are centered in the Malaysian and Indo-Chinese subregions. Those found in other countries tend to belong to more isolated systematic units. The further from the Oriental center, the more pronounced is the isolation. The Malaysian subregion has 12 genera (31 species); Indo-Chinese, 11 (29); but the Ethiopian Region (including Malagasy subregion), has only 4 genera (7 species, 2 of them are of doubtful status) altogether; Australian, 5 (10). The genera and species found in the latter two regions, for instance, *Aphrosiphon*, *Enderleinia* and *Soamachaerota* and the species included therein, are clearly more isolated in phylogenetic affinities (and more restricted in distribution) than are their counterparts found in the Malaysian and Indo-Chinese center. Genera and species found in countries between the "fringe" area and center, on the other hand, are moderately isolated.

Another tendency is that with two related genera, the lower one has fewer species and more limited distribution than the higher (Maa, 1961). This may be illustrated by the genera *Sigmasoma* and *Machaerota* of the tribe Machaerotini. *Sigmasoma* is more primitive and has only three isolated species in Java, Borneo and Thailand (the Thailand species is

more isolated than the other two). *Machaerota* is structurally more advanced, has about 50 species covering the entire Oriental region and penetrating to S. Japan and NW Australia. The species occurring in and near the Malaysian-Indochinese center, are more closely related to each other than are those of *Sigmasoma*. Species of the "fringe" area, such as *M. punctatonervosa* Sign. of Ceylon, *M. takeuchii* Kato of Japan and *M. pugionata* Stål of Australia, however, are more localized in distribution and specialized in structure.

Similar patterns and relationships are found in *Aphrosiphon* and *Hindoloides* (Hindoloidini), and *Chaetophyes* and *Hindola* (Enderleiniini).

The Cercopidae, an allied family of Machaerotidae, is nearly world wide in distribution —the Cercopinae and Clastopterinae are chiefly in tropic countries; and Aphrophorinae, temperate.

(B) Nymphal Habits

All the machaerotid nymphs construct calcareous tubes permanently fixed to plants above the ground and immerse themselves in clear fluid inside the tubes. In the most primitive forms of the family, such as *Soamachaerota*, which have strongly humpbacked body and telescoped abdomen, the tube is helical, circling the long axis for two to four times (fig. 2). In the most advanced forms, such as *Machaerota*, the tube is subcylindric (fig. 29A), the body is hardly humpbacked and abdomen slightly telescoped. Forms intermediate of these two extremes, like *Pectinariophyes* and others, construct subconic or slightly spiral tubes and have moderately humpbacked body and moderately telescoped abdomen. Evidently the general outline of nymphal tubes and of the adult body are collateral in evolution.

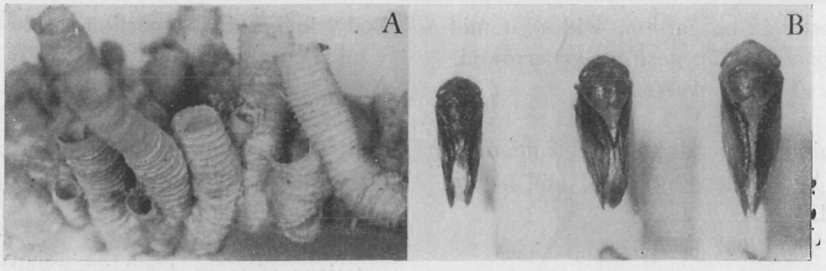

Fig. 29. A, *Machaerota* sp. indet., nymphal tubes, Burma *ex* U. S. National Mus. coll.; B, *Chaetophyes admittens* Wk., normal ♂ (left), intersex (center) and normal ♀ (right) Black Hill.

The cercopid nymphs all excrete and live in froth masses loosely attached to plants, either under (Cercopinae) or above the ground (Aphrophorinae and Clastopterinae). The froth is soapy and similar in nature to the fluid inside machaerotid nymphal tubes.

The machaerotid nymphs only feed on woody dicotyledons of the genera *Lithocarpus* (Fagaceae), *Celtis* (Ulmaceae), *Pipturus* (Urticaceae), *Prunus* (Rosaceae), *Bauhinia* (Leguminosae), *Zizyphus* (Rhamnaceae), *Grewia*, *Tilia* (Tiliaceae), *Gossypium*, *Hibiscus* (Malvaceae), *Adansonia* (Bombacaceae), *Eucalyptus* (Myrtaceae), *Melastoma* (Melastomaceae) and *Vitex* (Verbenaceae). A few of these genera may harbor more than one machaerotid species, but *Machaerota ensifera* Burm. is the only species known to feed on more than one genus of plants. The records are incomplete but do not rule out the possibility of evolu-

tionary parallelism of the plants and machaerotids.

On the other hand, the cercopid nymphs feed on both woody and herbaceous di- and monocotyledons, and some species have a wide host range. There appears a certain degree of the parallel evolution of the hosts and feeders. The dicotyledons are attacked by many Cercopinae and some Aphrophrinae, and the monocotyledons, by some Aphrophorinae and many Clastopterinae.

Evans (1940) suggested that subterranean habits and feeding on roots by the Cercopinae might be a primitive environmental adaptation. To this hypothesis, I might add that the direct ancestor of the Cercopoidea was a general underground feeder of plant roots and world-wide in distribution. Later, probably around the Miocene period, on the disappearing of tropical forests in the temperate and arctic zones, some of its descendents in the tropics came above ground and gradually became adapted to above-ground life and to certain plants. And still later, they acquired the ability to construct calcareous (and permanently fixed) tubes for additional protection and there appeared the Recent Machaerotidae. Their host range has been since then little changed, although the first appearance of machaerotids was probably earlier than that of monocotyledons and modern herbs.

(C) Nymphal Structure

The nymphal morphology of the Machaerotidae, unlike that of Cercopidae, is hardly known other than Evans' (1940) comparative studies of two unnamed machaerotids and one cercopid (*Bathyllus albicinctus* Erichs., Aphrophorinae). The results may be summarized as follows:

Cercopid nymph	Machaerotid nymph
Body shorter in proportion, widest at middle; abdominal apex strongly narrowed.	Body longer in proportion, widest behind middle; abdominal apex broadly rounded.
Antennae freely movable.	Antennae lying closely against sides of head, directed caudad.
Ventral air chamber loosely or temporarily closed by overlapping tergal and pleural ventral flaps.	Ventral air chamber permanently closed by a transparent membrane joining ventral margins of terga.
Ventral operculum absent.	Ventral operculum (formed by ventral dilatations of terga 4–6 joining each other at ventromedian line) sometimes present.
Wax-secreting glands present only on abdominal segments 7–8.	Wax-secreting glands present on abdominal segments 6–8.

The modifications taken by the machaerotids, as tabulated above, are slight, but evidently indicate the more advanced adaptations for tube-dwelling life. Observations on the mechanism and physiology of calcareous secretion will certainly disclose more differences between these two families.

The two machaerotids described by Evans are probably *Pectinariophyes stalii* Spgbg. and *Polychaetophyes serpulidia* Kirk. which belong to the tribe Enderleiniini. Nymphs of the other three tribes and the internal anatomy of adults of all machaerotids have scarcely been studied.

(D) Sexual Dimorphism

The sexual dimorphism, besides size and color, is generally insignificant in both the Cercopidae and Machaerotidae. Some genera of the latter family show distinct sexual characters, which seem to be of phylogenetic importance for related forms. The male and female of the genus *Polychaetophyes* which is apparently more primitive than and closely related to *Taihorina* are quite similar. But in the latter genus, the two sexes are conspicuously different. The postclypeus is strongly tuberculate in the male but plain in female, and the punctation is also somewhat different by sex. Similar association of the relative antiquity and the significance of sexual dimorphism is found in *Pectinariophyes* against *Chaetophyes* and *Hindola*. Again, within the genus *Chaetophyes*, species showing little sexual dimorphism (e. g., *vicina* Lall.) are apparently more primitive and have closer affinities to the genus *Pectinariophyes* (which is more primitive, close relative of *Chaetophyes*) than species showing strong sexual dimorphism (e. g., *compacta* Wk.).

(E) Fossil Records

No fossils are known of the Machaerotidae. About 20 extinct families from Permian, Triassic and Jurassic rocks are referable to the Homoptera but which of them are directly ancestral to the Recent Cercopoidea is uncertain (partly because the separation of this superfamily from the Jassoidea was rather recent, probably at the Jurassic period, and partly because most fossils are only represented by tegmina). The generally accepted, earliest record of the suborder is the Archescytinidae from Lower Permian rocks in Kansas, but the common ancestor of the Homoptera almost certainly existed back in the Carboniferous. The wings (fig. 30A) of the Archescytinidae were virtually of the same size and shape and with similar venation as in tegmina. Hence the meso- and metathorax were probably also of similar size. When in repose, the tegmina and wings both probably laid horizontally at sides of the body, not over the back and with the anal lobes (of wings) folded. The antennae were very long and consisted of about 25 segments. These features are not found in any Recent Auchenorrhyncha.

Important venational features of the Archescytinidae in contrast to Machaerotidae are

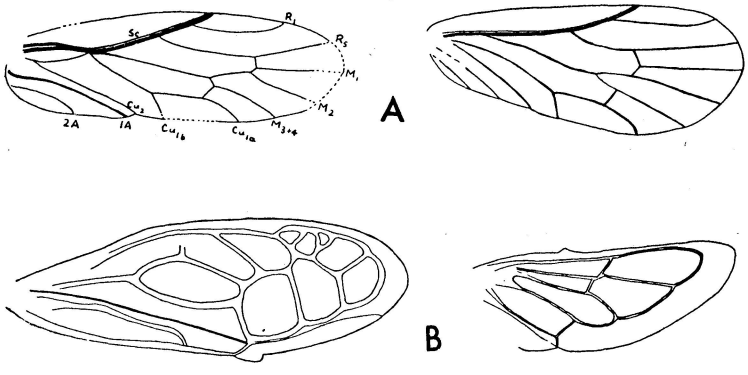

Fig. 30. Tegminal and wing venation. A, *Archescytina permiana* Tillyard, Archescytinidae, redrawn from Carpenter 1954: 813; B, *Machaerota ensifera* Burm., modified from Baker 1919: pl. 2. For tegminal venation of Enderleiniinae, see figs. 3-4.

the presence of a free (and remote from radius), complete, nearly straight subcosta (of tegmina), 3-branched median, 2-branched and strongly curved Cu_1, and 2 independent anal (claval) veins, and the absence of the ambient vein and nodal line. The claval furrow of the Archescytinidae was not so deep as in Upper Permian and Recent Homoptera. The legs were all long and slender except the fore femora which were short and swollen; the tibiae apparently had no spines and spurs; the tarsi were not deeply cleft apically; and tarsal segment 2 was subequal in length to the 3rd and, except in the hind pair, only slightly shorter than the 1st.

The comparative morphology of the Permian and Recent Homoptera, including their male genitalia, has been worked out by Bekker-Migdisova (1946, 1948). But her papers are unavailable, and no comments can be made here. From other sources of information, the evolutionary trend from the Permian homopterous ancestor to Recent Machaerotidae appears to be the reduction of the maxillary plates, subcosta, M and Cu_1 branches and anal vein of tegmina and the reduction in size and veins of wings, as well as the development of ambient vein, nodal line (which borders the corial appendix), tibial and tarsal spines and spurs, etc. and the differentiation in size, shape and function of the hind legs from fore and mid legs.

The Mesozoic Auchenorryncha fauna is hardly known besides a few genera and species referable to Scytinopteridae, Ipsiviciidae, Procercopidae, etc. The earliest fossils referable to the Recent Cercopinae and Aphrophorinae appeared in the Oligocene when the climate was warm and humid and there were world-wide tropical forests. The earliest Clastopterinae appeared in the Miocene when the climate changed greatly, became cool and semi-arid, the plant distribution was restricted and the reduction of forests began. These three subfamilies probably existed in Late Mesozoic, but the evolutionary trend leading from the Permian homopterous ancestor to the Tertiary and Recent Cercopoidea is very difficult to trace with certainty.

Nymphs presumed to be of the Cercopidae have been recorded from the Jurassic, but their status would not be certain until verified by adults of the same formation.

By summing up the above discussions of fossil records, a hypothetical machaerotid ancestor might be postulated as follows: Early Tertiary. Subtropic. Nymph living above ground in a thin, slightly hardened tube of irregular shape which is loosely attached to a woody dicotyledon (in some Aphrophorinae, such as *Serpullia*, the outer surface of the froth-mass becomes slightly hardened and somewhat tube-like on drying). Nymphal structure as in Cercopidae. Adult showing no sexual dimorphism. Body short, robust, humpbacked. Head short, broad; maxillary plate reduced; frons not definable. Scutellum long, low, lacking median fovea and apical process. Tegmina apically broadly rounded; corial appendix (membrane) distinct. Venation similar to that in Hindoloidini, subcosta of tegmina strongly curved, forming a strong tooth-like ridge ventrally; media complete, apically branched; anal veins independent to each other; longitudinal vein 1 (R) of wings branched preapically and reunited apically. Legs long; hind tibiae each with 2 lateral spines; apical lobes of tarsal segments short and symmetrical. Male genitalia with well developed periandrium; aedeagus with apical or median process; genital plates large, well defined from sternite; anal segment with false ring; sub-anal lobe of pygofer large but not granulose or spinulose.

Members of the Recent Machaerotidae are very uniform in head and thoracic struc-

ture, tegminal and wing venation and even in male genitalia. The changes of their fundamental structure are slight and gradual within the family. This indicates that their structure (and also nymphal habits) has been hardly modified since deviating from the cercopid stock, probably largely because of the security and micro-ecological consistency of the tube-dwelling life.

(F) Systematic Position of the Family

The long scutellar process of the Machaerotinae (not found in Enderleiniinae) suggests the pronotal processes of the Membracidae. By this superficial resemblance, some authors assumed the Machaerotidae to have been derived from the Membracidae and to be the forerunners of Cercopidae. But the head structure and venational scheme do not support this assumption. The family in question is closest to the Clastopterinae and is interlinked by the tribe Ibini of the latter (Maa, in press). Fig. 31, modified from Evans (1946), shows affinities of the Machaerotidae and related families.

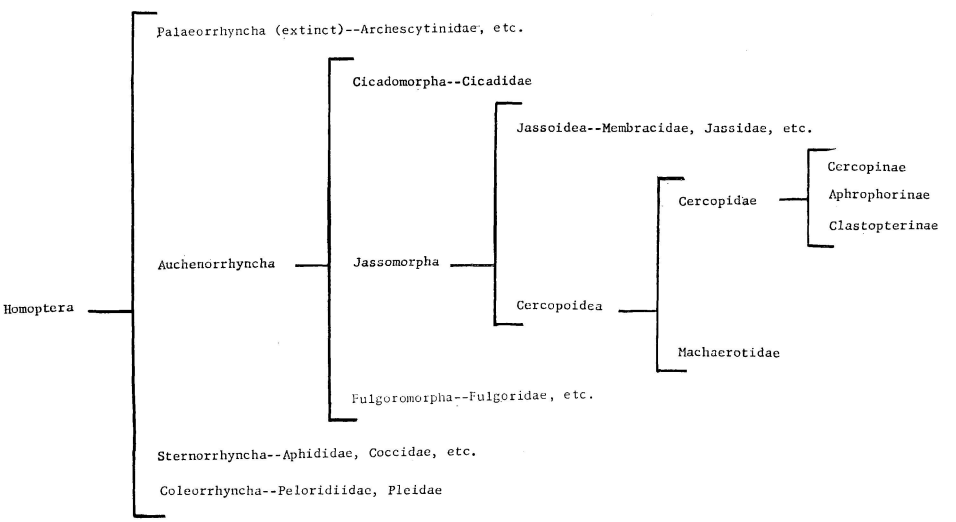

Fig. 31. Systematic position of the Machaerotidae.

(G) Evolution within the Family

Insofar as the phylogeny within the family is concerned, the characters involved may be arbitrarily grouped as:

(a) Primary characters: Descended from the ancestor, serial and gradual in change, useful for separating higher taxa. For example, the anal veins of the tegmina are paired and independent in the Archescytinidae and most Jassoidea and Cercopidae but merged in higher Machaerotidae. The gradations of the changes are shown in fig. 32.

(b) Secondary characters: Often suddenly appeared and disappeared within the family, never continuously toward one direction throughout the family, useful for separation of lower taxa but less significant in phylogeny. For instance, the anterolateral margin of the pronotum (in proportion to posterolateral margin) is long in the lower forms of 3 of the

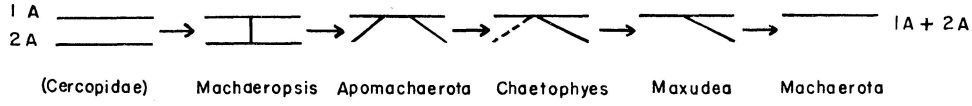

Fig. 32. Example of serial changes in anal veins of the Machaerotidae (diagrammatic).

4 tribes, Hindoloidini, Enderleiniini and Machaerotini, and short or very short in the higher forms of the same. Hence this character appears and disappears within a tribe. Sometimes, the same tendency may occur even within a genus or a species-group. In the genus *Machaerota*, the horizontal head process of *M. punctatonervosa* Sign. and the spine-like posterolateral pronotal angles of *M. humboldti*-group are examples. Moreover, characters as the male postclypeal tubercles of *Taihorina* and *Hindola* (Enderleiniini) and the head process of *Sigmasoma*, *Platymachaerota*, *Grypomachaerota* and *Tapinacaena* (Machaerotini) are merely analogous.

The following is a selection of both primary and secondary characters, showing the presumed extremes of the changes. Details of serial changes for each character, as in fig. 32, are not given.

Generalized type	Specialized type
Body short, robust.	Body long, slender.
Head broad, short, strongly declivous; postclypeus strongly convex.	Head narrow, long; crown almost horizontal; postclypeus less convex.
Pleurostome broad; maxillary plate more exposed.	Pleurostome narrow; maxillary plate hardly exposed.
Eyes weakly swollen, transverse in dorsal view of head.	Eyes strongly swollen, roundish in dorsal view of head.
Ocelli closer to each other than to eyes.	Ocelli farther from each other than from eyes.
Longitudinal suture exterior to each ocellus not discernible.	Longitudinal suture exterior to each ocellus clearly defined.
Pronotum strongly convex, lacking lateral ampliation; anterolateral margin short.	Pronotum weakly convex, with lateral ampliation; anterolateral margin long.
Scutellum simple.	Scutellum foveate and/or with free apical process.
Tegmina short, broad, with more complicated venation; apical margin almost perpendicular to anal margin.	Tegmina long, narrow, with reduced venation; apical margin apparently oblique.
Sc strongly curved, apart from costal margin, and ventrally forming a strong tooth-like tubercle.	Sc almost straight, close to costal margin and ventrally only forming an evenly weak ridge.
Rs and M gently curved.	Rs and M abruptly switched analward.
Cu_1 close to claval furrow and with short apical abscissa.	Cu_1 apart from claval furrow and with long apical abscissa.
Clavus with 2 longitudinal and 1 crossveins.	Clavus with only 1 longitudinal vein.
Claval furrow forming a narrow interior angle with apical corial margin.	Claval furrow forming a very wide interior angle with apical corial margin.

Wings with fairly large anal lobe and branched Cu_1 and 1A+2A, and when closed, the apices almost reaching those of tegmina.

Legs short and stout; hind tibiae with 2 lateral spines; inner and outer apical lobes of hind tarsomeres subequal in length.

Abdomen strongly telescoped; superior margin in profile strongly sinuate; ♀ ovipositor sheath vertical.

Aedeagus long, strongly narrowed apicad; subanal lobe of ♂ pygofer large; anal segment (♂) divided.

Wings with small anal lobe and unbranched veins, and when closed, the apices far from reaching those of tegmina.

Legs long and slender; hind tibiae with no lateral spines; inner apical lobes of hind tarsomeres much longer than outer ones.

Abdomen hardly telescoped; superior margin in profile almost straight; ♀ ovipositor sheath oblique.

Aedeagus short, hardly narrowed apicad; subanal lobe of ♂ pygofer small; anal segment (♂) entire.

In consideration of the factors enumerated and discussed above, a family tree of the

Fig. 33. Probable family tree of the Machaerotidae.

subfamilies, tribes and genera may be constructed as in figs. 33–35. Space does not permit me to go into the phylogeny of the species.

GEOGRAPHIC SUMMARY

Discussions on the zoogeographic distribution of the Machaerotidae have been presented elsewhere by me (1961) and need not be repeated here (but the figures given in the table should be corrected). The following is a list of species, including new synonyms, for each zoogeographic subregion:

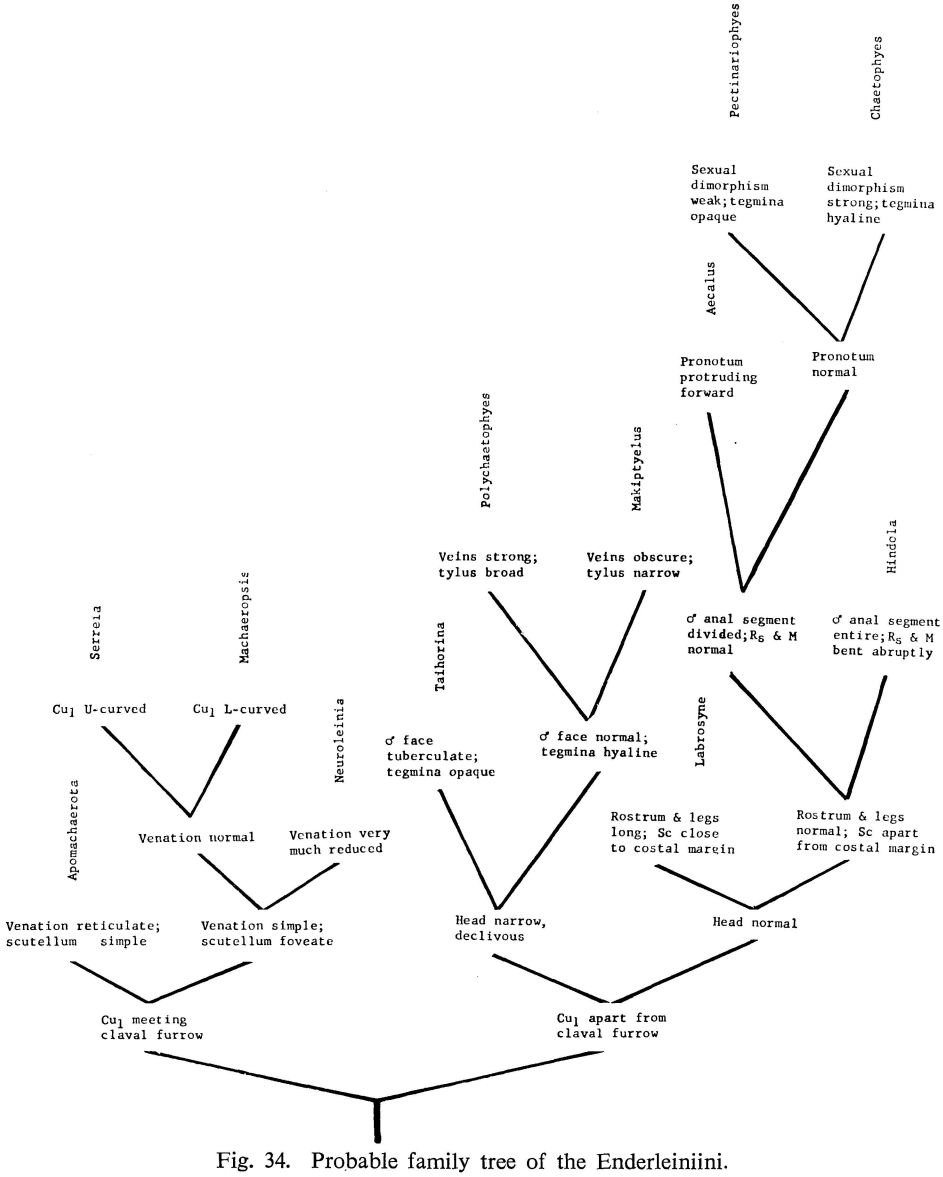

Fig. 34. Probable family tree of the Enderleiniini.

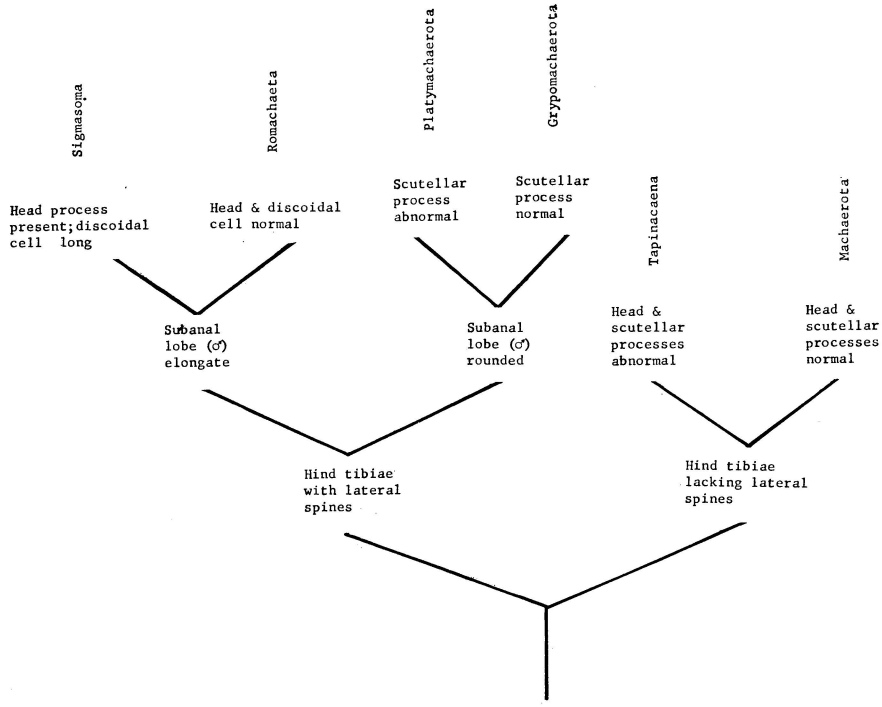

Fig. 35. Probable family tree of the Machaerotini.

(A) W. and E. African Subregions

Aphrosiphon bauhiniae China 1935. Nyasaland.
Enderleinia bispina E. Schmt. 1907. Ivory Coast, Togoland, Uganda.
E. fumipennis E. Schmt. 1924 (?=*bispina*). Kamerun.
Neuromachaerota vosseleri E. Schmt. 1912. Tanganyika.
N. obscurior Jacobi 1922 (?=*vosseleri*). Tanganyika.

(B) S. African Subregion

Neuromachaerota discigutta Maa 1963. Transvaal, S. Rhodesia, SW Africa.
Pectinariophyes hyalinipennis (Stål) 1855. (**n. syn.**: *Hindola fasciata* Lall. 1955). Natal, Transvaal, S. Rhodesia.

(C) Ceylonese Subregion

Machaeropsis valida Mel. 1903. Ceylon.
Pectinariophyes notanda (Dist.) 1916. S. India (Nilgiri Hills).
Aecalus lucidus (Dist.) 1916. S. India (Cochin State).
Conditor collatatus Dist. 1916. S. India (Cochin State, Coorg).
Machaerota punctatonervosa Sign. 1879. (**n. syn.**: *M. guttigera* Wwd. 1886). Ceylon.
M. pandata Dist. 1916. S. India (Nilgiri Hills, Cochin State, etc.).

(D) Indian Subregion

Hindoloides indicans Dist. 1915. Bengal.
Machaerota spangbergii Sign. 1879. (**n. syn.**: *M. punctulata* Sign. 1879, *M. planitiae* Dist. 1907, *M. noctua* Dist. 1916). Bihar, Punjab, Bengal, Bombay, Madras, "Silhet."
(For *Taipinacaena sigmatoides* and *Machaerota assamensis* of Assam, see under Indo-Chinese Subregion; for *M. andamanensis* of the Andamans, see under Malaysian Subregion).

(E) Manchurian and Indo-Chinese Subregions

Hindoloides sparsuta Jacobi 1944. Fukien.
H. bipunctata (Hpt.) 1923. (**n. syn.**: *H. formosana* Kato 1929, *H. rubrodorsum* Esaki 1931, *H. rubr.* varr. *albifascia* and *marginale* Kato 1933, *H. bip.* varr. *diluta* and *scutellata* Maa 1947). Szechwan, Fukien, Taiwan, S. Japan.
H. trilineata Maa 1947. Fukien.
Machaeropsis rubrilineata Maa 1963. Thailand.
Taihorina geisha Schum. 1915. (**n. syn.**: *Neuromachaerota becquarti* Liu 1942, *Aphromachaerota adusta* Lall. 1951). Korea, Kirin, Liaoning, Kiangsu, Fukien, Taiwan, Kweichow, Vietnam.
T. simplex Maa 1963. Vietnam.
Makiptyelus dimorphus Maki 1914. Taiwan.
Labrosyne longipes Maa 1963. Vietnam.
Hindola (*Hindola*) *taiwana* (Kato) 1933. Taiwan, Vietnam.
Sigmasoma chakratongi Maa 1963. Thailand.
Romachaeta brachynotum Maa 1963. Thailand.
Platymachaerota gressitti Maa 1963. Vietnam.
Taipinacaena sigmatoides Maa 1963. Assam.
T. rotundata Maa 1963. Thailand.
Machaerota assamensis Dist. 1916. Assam.
M. flavolineata Dist. 1907. Upper Burma, Tenasserim, Vietnam.
M. elegans Maa 1963. Thailand.
M. coomani Lall. 1945. Tonkin, Vietnam, Hainan.
M. brunnipes (E. Schmt.) 1919. Lower Burma, Thailand.
M. discreta (E. Schmt.) 1919. (**n. syn.**: *M. incerta* Lall. 1927). Tenasserim, Thailand.
M. exaggerata Maa 1949. Tonkin.
M. coronata (Maa) 1947. Fukien.
M. esakii Kato 1939. Taiwan.
M. taiheisana (Matsum.) 1940. Taiwan.
M. fukienicola Maa 1947. Fukien.
M. formosana Kato 1928. (**n. syn.**: *M. extensa* Maa 1956). Taiwan.
M. takeuchii Kato 1931. Japan.
(For *Hindola* (*Hindola*) *viridicans* Stål of Tenasserim, see under Malaysian Subregion).

(F) Malaysian Subregion

Apomachaerota reticulata E. Schmt. 1907. Sumatra, Borneo.
Machaeropsis nervosa (Lall.) 1936. Borneo.

Neuroleinia collarti Lall. 1936. Borneo.
Taihorina batangana (Lall.) 1951. Malaya (Perak).
Pectinariophyes rudinotum Maa 1963. Borneo.
Hindola (*Hindola*) *apicalis* Maa 1963. Java.
H. (*H.*) *pahangana* (Lall.) 1951. Malaya (Pahang), (?) Sumatra.
H. (*H.*) *borneensis* (Bkr.) 1927. Borneo.
H. (*H.*) *tumidula* Maa 1963. Borneo.
H. (*H.*) *viridicans* (Stål) 1854. (**n. syn.**: *Modiglianiella sumatrensis* E. Schmt. 1912, *Quinquatrus dohertyi* Dist. 1916). Malaya, Sumatra, Java, Borneo. Also Tenasserim, Amboina (introduced).
H. (*H.*) *nitidia* Bkr. 1927. Borneo.
H. (*H.*) *tamangana* (Lall.) 1951. Malaya (Pahang).
H. (*H.*) *striata* Maa 1963. Java.
H. (*H.*) *fulva* Bkr. 1927. Malaya, Borneo.
H. (*Platycotta*) *prostrata* Maa 1963. Borneo.
Maxudea crassiventris E. Schmt. 1907. (**n. syn.**: *M. schmidtii* Bkr. 1919). Malaya, Sumatra.
Blastacaena rugiceps Maa 1963. Borneo. Also (?) Kei Is.
Sigmasoma bifalcatum E. Schmt. 1907. Java.
S. borneense (Bkr.) 1919. Borneo.
Grypomachaerota turbinata E. Schmt. 1907. (**n. syn.**: *G. tricolor* Bkr. 1919). Malaya, Sumatra, Java, Borneo, Banguey.
G. breviceps Bkr. 1919. Malaya (Penang).
Platymachaerota elevata E. Schmt. 1919. Borneo.
Machaerota notoceras E. Schmt. 1907. Malaya, Sumatra, Java.
M. signatipennis Maa 1963. Malaya (Selangor).
M. latior Maa 1963. Malaya (Perak).
M. luzonensis E. Schmt. 1907. Sumatra, Java.
M. andamanensis Dist. 1907. Andaman Is.
M. subnasuta Maa 1949. Sumatra, Java.
M. palawana Maa 1963. Palawan.
(For *M. rastrata* of Java and Sumatra, see under Wallacea Subregion; for *M. ensifera* of Palawan, see under Philippine Subregion).

(G) Philippine Subregion

Serreia notabilis Bkr. 1927. (**n. syn.**: *S. notabilis* var. *luzonensis* Bkr. 1927). S. Mindanao, Luzon.
Pectinariophyes luzonensis (Bkr.) 1927. Luzon.
P. basicostalis Maa 1963. N. Mindanao.
Machaerota mindanaensis (Bkr.) 1927. N. Mindanao, Leyte.
M. philippinensis Bkr. 1919. Luzon, Mindoro.
M. longiscutata Maa 1963. S. Mindanao.
M. convexa Maa 1963. Luzon.
M. confusa Maa 1963. (n. name for *M. luzonensis* Bkr. 1919, misinterpretation). S. Mindanao.
M. attenuata (Bkr.) 1927. S. Mindanao.
M. fusca Bkr. 1919. Luzon.

M. virescens Maa 1956. Luzon.
M. ensifera Burm. 1835. (**n. syn.**: *M. ensiferina* E. Schmt. 1907, *Conmachaerota bakeri* Lall. 1951). All-over the Philippines, including Palawan and Balabac.
(For *M. palawana* of Palawan, see under Malaysian Subregion).

(H) Wallacea Subregion

Aecalus pembertoni Maa 1963. Celebes.
Chaetophyes ceramensis Lall. 1927. Ceram.
Machaerota siebersi (E. Schmt.) 1928. Kei Is.
M. moluccana Kirk. 1913. (**n. syn.**: *M. insignis* Lall. 1927). Amboina, Ceram.
M. foveata (Maa) 1949. Celebes.
M. rastrata (Wk.) 1868. (**n. syn.**: *M. lieftincki* Maa 1949, *M. carinata* Lall. 1951). Flores, Sumba. Also Java, Sumatra.
M. nigrifrons (E. Schmt.) 1907. Sumba.
(The occurrence of *Blastacaena rugiceps* Maa in the Kei Is. is very improbable. For *Hindola* (*Hindola*) *viridicans* Stål of Amboina (introduced), see under Malaysian Subregion).

(I) Papuan Subregion

Trigonurella simonthomasi Maa 1963. W. New Guinea.
T. szentivanyi Maa 1963. W. New Guinea.
Pectinariophyes antica Jacobi 1922. NE New Guinea.
Chaetophyes lubricans Maa 1963. W. New Guinea.
Ch. kukukukui Maa 1963. NE New Guinea.
Ch. bloetei Maa 1963. W. New Guinea.
Machaerota ampliata Maa 1963. NE New Guinea.
M. humboldti (Lall.) 1927. W. New Guinea, NE New Guinea.
M. woodlarki Maa 1963. Woodlark Is.
(For *Pectinariophyes stalii* of Papua, see under Australian Subregion).

(J) Australian Subregion

Soamachaerota appendiculata Hack. 1926. (**n. syn.**: *Soa tmetoptera* Jacobi 1928). Queensland.
Polychaetophyes serpulidia Kirk. 1906. Queensland, S. Australia.
Pectinariophyes reticulata (Spgbg.) 1877. Queensland, N. S. Wales, W. Australia.
P. stalii (Spgbg.) 1877. (**n. syn.**: *Carystus sorurculus* Spgbg. 1877, *Polychaetophyes aequalior* Kirk. 1906, *Pectinariophyes pectinaria* Kirk 1906). Queensland, N. S. Wales, Victoria, S. Australia, Tasmania. Also SE New Guinea (Papua).
Chaetophyes admittens (Wk.) 1858. Queensland, N. S. Wales, Victoria, S. Australia, Tasmania.
Ch. compacta (Wk.) 1851. (**n. syn.**: *Carystus mutabilis* Spgbg. 1877, *Chaetophyes bicolor* E. Schmt. 1919). Queensland, N. S. Wales, Victoria, S. Australia, Tasmania.
Ch. vicina Lall. 1927. Queensland, N. S. Wales, W. Australia, S. Australia.
Machaerota finitima Jacobi 1928. Queensland.
M. pugionata Stål 1865. (**n. syn.**: *M. signoreti* E. Schm. 1907). NW Australia, N. Territory.

FIVE CASES OF STYLOPIZED TRANSITORY INTERSEXUALITY

Transitory intersexuality or so called "parasitic castration" caused by stylopization has been well known in Hymenoptera Aculeata and Hemiptera Auchenorrhyncha. In the latter group, many stylopized delphacids have been described[4], but nothing recorded from the Machaerotidae. The five stylopized examples found among material examined are briefly described below. Their internal structures were not examined, and the stylops are unnamed.

Case 1. *Pectinariophyes stalii* (Spgbg.) from Yarra Yarra Figs. 3H, 25C.

The stylopized example was probably destined to be a female. It was collected at Yarra Yarra Creek, Riverina Dist., New South Wales, Australia, 5.I.1933, by A. Musgrave and is in the Australian Museum, Sydney. No other specimens of the species were collected at that locality. The cephalothorax of the parasite protruded between sternites 6 and 7 of the host abdomen.

The size of the example is intermediate between average males and females; tegmen 5.2 mm long, 2.2 mm broad. The head is normal; pronotum with coarse deep punctures and irregular rugae; the rugae at posterior half more dominant than punctures, sharply rimmed and mostly about as wide as punctural diameter; scutellum not foveate at apex, and ratio of its median length and basal breadth about 27 : 17. The tegmen (fig. 3H) is somewhat similarly colored as a normal male, with three brown fasciae; first fascia triangular, at extreme base; second, curved, lying before middle of the tegmen, extending to clavus and nearly black at corium; third, running along apical margin; area between first and second fasciae yellow and semitransparent; that between second and third ones, clear hyaline, with brown veins. The tegminal venation is very unusual for the family and only comparable to that of *Apomachaerota reticulata* E. Schmt. 1907 which has no close affinities with *Pectinariophyes*. The veins Rs and M do not follow ordinary courses but are irregularly branched and strongly zigzagged; veinlets and free-ended stubs numerous, forming about 45 closed cells. The legs and abdomen are normal, although the latter is rather distended and slightly distorted due to the presence of the parasite.

Case 2. *Pectinariophyes stalii* (Spgbg.) from Botany Bay

This stylopized example was probably destined to be a male. It was collected, along with a series of normal males and females, at Botany Bay, New South Wales by H. Petersen and is in the U. S. National Museum collection. The cephalothorax of the parasite protruded from between sternites 6 and 7 at the left side.

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4. Ahlberg, O. 1925. Zikaden Parasiten unter den Strepsipteren und Hymenopteren. Centralanst. Försöks. Jordbruks. (Stockholm), Medd. **287** (Ent. Avdel. no. 46): 79-86, 6 figs. (Not seen).

Haupt, H. 1916. Beiträge zur Kenntnis der Cicadenfeinde. Zschr. Wiss. Ins.-Biol. **12**: 200-4, 217-23, 274-79, 13 figs.

———— 1933. Transitorische Intersexualität bei Homopteren (Fulgoridae). Zool. Anz. **101**: 255-60, 4 figs.

Hassan, A. I. 1939. The biology of some British Delphacidae (Homopt.) and their parasites with special reference to the Strepsiptera. Trans. Ent. Soc. Lond. **89**: 345-84, 32 figs., 10 tab.

Lindberg, H. 1949. On stylopization of Araeopids. Acta Zool. Fenn. **57**: 1-40, 4 pls.

Smith, G. & A. H. Hamm. 1914. Studies in the experimental analysis of sex. Part II. On stylops and stylopization. Quart. Jour. Microsc. Sci. **60**: 435-61, 4 pls.

The size of the example is intermediate of average males and females, and its tegmen 5 mm long and 2 mm wide. The head is normal; reticulation-meshes of the pronotum much darker than ground color and mostly wider than reticulation-rims, scutellar apex scarcely foveate; apical margin of tegmen faintly stained yellow. The tegminal venation is normal; the legs too, although the basal lateral spine on the hind tibia is very poorly developed. The anal segment and anal style are intermediate of normal males and normal females. The pygofer is superficially similar to that of a normal female and there is no indication of the presence of granulose lobes; its apical and preapical carinae are not prominent, and the posterior lateral margins meet each other between the anal segment and the aedeagal base. The aedeagus is markedly atrophied. The subgenital plates are atrophied too, and are slightly asymmetric and subacute at the apices.

In comparing with the case 1, which is of the same species, it is interesting to note that the effect of stylopization to the adult male characters seems to be different to that to the female characters. The site of the parasites inside their hosts as here described is virtually the same. The abdominal apex was affected in all cases for the male, but not so for the female. The degree of the abnormality in external characters is probably related to the degree of damage to the internal organs caused by the parasite and to the stage of development of the host when it is parasitized. Furthermore, as far as the cases 2 to 5 (males) are concerned, the degrees of changes at the abdominal apex and at other parts of the body seem to be parallel. The explanation of such phenomena however will depend upon anatomical and experimental studies.

Case 3. *Chaetophyes admittens* (Wk.) Figs. 12 E–H, 29B.

The stylopized example was probably destined to be a male, and was collected, along with a series of normal males and females. The shape of the head is similar to a normal male, and the median length of its crown subequal to side length. The pronotum, scutellum, tegmina and legs are all normal. The abdominal apex (fig. 12 E–H) is dominantly male but its upper part is dominantly female; aedeagus and subgenital plate deformed; pygofer lacking a granulose subanal lobe which is one of the constant and distinctive male characters of the family.

Case 4. *Hindola* (*Hindola*) *nitida* Bkr.

The stylopized example in question was probably destined to be a male and was originally one of the syntypes of this species from Sandakan, N. Borneo in the U. S. National Museum collection. The position of the cephalothorax of its parasite is the same as in case 1. The size of the example is once again intermediate of normal males and normal females. The tegmen measures 3.4 mm long and 1.7 mm wide. Besides the size, the only noticeable superficial feature is the lacking of the brownish fascia at the middle of the tegmen. In structure, including postclypeal protuberance, anal segment and anal style, it shows no difference from normal males. Other parts of the abdominal apex are similar to that in cases 2 and 3, *viz.*, the subgenital plates are long, rather evenly narrow and scarcely shorter than the aedeagus; the pygofer apically widely open, and lacks granulose lobes (the apical and preapical carinae are present at each side). The last character appears to be the most conspicuous and fundamental change resulting from stylopization.

Case 5. *Pectinariophyes stalii* Spgbg. from Papua

The Hope Museum at Oxford University possesses a stylopized example of this species from Milne Bay, Papua. It is similar to those described above. The body size is intermediate of normal males and females, but the color and structure are closer to a normal male than female. The anal style is very hairy and deep-black, aedeagus and genital styles vestigial, and granulose area of pygofer wanting. The cephalothorax of the parasite is partly protruding between abdominal sternites 5 and 6 of the host.

Discussion on Transitory Intersexuality

1. As mentioned above, the nymphs of the Machaerotidae construct hard calcareous tubes and immerse themselves in excreted fluid inside the tubes. Probably the only chance for the triungulins (of stylops) to reach and attack them would be before the completion of the tubes by the newly-hatched nymphs. Consequently stylopization is uncommon in this family.

2. There are records of the triungulins attacking adult hosts. But in such cases, the external structure of the host would not be affected. The 5 cases described above were not of this category.

3. It is generally known that stylopized males tend to exhibit female external characters, but the equivalent changes do not occur in stylopized females. Here both sexes seem to have been affected, since the tegminal fasciae are never conspicuous in the females of *Pectinariophyes.*

4. Stylopization often leads to the change of the color pattern and distortion of abdominal apex, but its effect on the venation has been little known. The venation in case 1 is so similar to the archaic genus *Apomachaerota*, that parasitism may possibly induce the recurrence of certain archaic characters.

SELECTED BIBLIOGRAPHY

Baker, Charles F. 1919. The Malayan Machaerotinae (Cercopidae). Philipp. Jour. Sci. **15**: 67–80, 3 pls., 1 fig. (*Machaerota philippinensis*, *M. fusca*, *Grypomachaerota borneensis*, *G. breviceps*, *G. tricolor*, *Maxudea schmidtii* spp. n.; keys to spp. of the 3 genera.)

———— 1927. Some Philippine and Malaysian Machaerotidae (Cercopoidea) *op. cit.* **32**: 529–47, 4 pls. (*Conmachaerota mindanaensis*, *C. attenuata*, *Hindola luzonensis*, *H. fulva*, *H. nitida* spp. n.; *Serreia notabilis* (& var. n. *luzonensis*), *Parahindola borneensis* genera & spp. n.; keys to families of Cercopoidea, genera of Hindolinae, spp. of *Conmachaerota.*)

Burmeister, Hermann C. C. 1835. Handbuch der Entomologie. **2** (1): 1–396. Berlin. (*Machaerota ensifera* gen. & sp. n.)

China, William E. 1935. A new genus and species of Machaerotidae (Homoptera) from Nyasaland. Proc. Ent. Soc. Lond. A **10**: 82–84, 1 fig. (*Aphrosiphon bauhiniae* gen. & sp. n.)

Distant, William L. 1907. Fauna of British India including Ceylon and Burma. Rhynchota **4** (1): i-x & 1–264, 170 figs. London. (Part 2 was published in 1908). (Enum. of 1 *Machaeropsis* & 7 *Machaerota* spp.; *Machaerota andamanensis*, *M. flavolineata*, *M.*

planitiae spp. n.)

———— 1915. A few undescribed Rhynchota. Ann. Mag. Nat. Hist. ser. 8, **15**: 503–7. (*Hindoloides indicans* gen. & sp. n.)

———— 1916. Fauna of British India including Ceylon and Burma. Rhynchota **6**: i-viii & 1–248, 177 figs. (*Machaerota assamensis*, *M. noctua*, *M. pandata*, *Hindola lucida* spp. n.; *Conditor collatatus*, *Quinquatrus dohertyi*, *Xenaias notandus* genera & spp. n.)

Esaki, Teiso. 1931. Undescribed Hemiptera from Japan and Formosa. Annot. Zool. Jap. **13**: 259–69, 8 figs. (*Hindoloides rubrodorsum* sp. n.)

———— 1932. Hemiptera. Iconographia Insectorum Japonicorum: 1556–1887, figs. (5 spp. illus. & descr.)

Evans, J. W. 1940. Tube-building Cercopids (Homoptera, Machaerotidae). Trans. Roy. Soc. S. Australia **64**: 70–75, 6 figs. (Morphology & tube formation of nymphs.)

Hacker, Henry. 1922. On the emergence of two tube-dwelling homopterous insects. Mem. Queensl. Mus. **7**: 280–82, pls. 17–18.

———— 1926. New species of Queensland Cercopidae (Homoptera). *op. cit.* **8**: 243–48, pl. 42. (*Polychaetophyes perkinsi*, *P. appendiculata* spp. n.)

Haupt, H. 1923. Die Homoptera der Tibetreise W. Stötzners. Deutsch. Ent. Zschr. **1923**: 295–306, 3 figs. (*Weigoldella bipunctata* gen. & sp. n.)

Jacobi, Arnold. 1922. Kritische Bemerkungen über die Cercopidae (Rhynchota, Homoptera). Archiv Naturg. **87**A (12): 1–65, 7 fig. (*Neuromachaerota obscurier*, *Pectinariophyes antica* spp. n.)

———— 1928. Results of Dr. E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. Rhynchota Homoptera. 1. Fulgoridae und Cercopidae. Arkiv Zool. **19**A (28): 1–50, 31 figs. (*Machaerota finitima* sp. n.; *Soa tmetoptera* gen. & sp. n.)

———— 1944. Die Zikadenfauna der Provinz Fukien in Südchina und ihre tiergeographischen Beziehungen. Mitt. Münchn. Ent. Ges. **34**: 5–66, 16 figs. (*Hindola robusta*, *Hindoloides sparsuta* spp. n.)

Kato, Masayo. 1928. Descriptions of one new genus and some new species of the Japanese Rhynchota-Homoptera. Trans. Nat. Hist. Soc. Formosa **18**: 28–37, 2 pls. (*Machaerota formosana*, *Makiptyelus fasciatus* spp. n.)

———— 1929. Descriptions of some new Formosan Homoptera. *op. cit.* **19**: 540–51, 1 pl., 2 figs. (*Hindoloides formosana* sp. n.)

———— 1931. Notes on a new Machaerotid from Honshiu. Mushi **4**: 60–62, 2 figs. (*Machaerota takeuchii* sp. n.)

———— 1933. Homoptera, Cicadidae, Membracidae, Ledridae, Machaerotidae, Cercopidae, Fulgoridae. Cat. Jap. Ins. **1**: 1–38, 1 fig. (*Hindoloides rubrodorsum* var. n. *albifascia*; *Machaeropsis taiwana* sp. n.)

———— 1933a. Three colour illustrated insects of Japan. **4**: pls. 1–50. (*Hindola rubrodorsum* var. n. *marginale*.)

———— 1939. A report of the investigation on *Machaerota takeuchii* Kato, with a catalogue of Japanese Machaerotidae. Volumen jubilare pro Prof. Sadao Yoshida **1**: 643–50, 2 figs. (*Machaerota esakii* n. n. for *M. ensifera* Esk.)

Kirkaldy, George W. 1900. Bibliographical and nomenclatorial notes on the Rhynchota. No. 1. Entomologist **33**: 25–28. (*Hindola* n. n. for *Carystus* Stål.)

———— 1906. Leaf-hoppers and their natural enemies. Pt. IX. Leaf-hoppers–Hemi-

ptera. Bull. Hawaii. Sugar Pl. Assn. Exp. Sta. Div. Ent. **1** (9): 271–479, 32 pls. (*Polychaetophyes serpulidia, Polych. aequalior, Pectinariophyes pectinaria* genera & spp. n.)

———— 1913. On some new species of leaf-hoppers. *op. cit.* **12** (1): 7–27. (*Machaerota moluccana* sp. n.)

Lallemand, Victor. 1912. Homoptera, Fam. Cercopidae. Genera Ins. (Wytsman) **143**: 1–167, pls. 1–8.

———— 1927. Descriptions de Cercopides nouveaux provenant de la collection du British Museum. Trans. Ent. Soc. Lond. **75**: 99–118. (*Chaetophyes ceramensis, Ch. vicina, Machaerota insignis, M. incerta, Promaxudea* (gen. n.) *humboldti* spp. n.)

———— 1933. Entomological investigations on the spike disease of sandal (4). Cercopidae (Homopt.) Indian For. Rec. **18** (1): 1–4. (*Beesoniella sylvestris* gen. & sp. n.)

———— 1936. Descriptions de trois genres et de deux espèces nouvelles de Homoptera de l'Insulinde et du l'Oceanie. Festschr. 60. Geburstag. E. Strand **1**: 264–66, 1 fig. (*Metaenderleinia nervosa, Neuroleinia collarti* genera & spp. n.)

———— 1942. Cercopides du Museum de Paris. Bull. Mus. Paris ser. 2, **14**: 428–32. (*Machaerota coomani* sp. n.)

———— 1951. Cinquième note sur les Cercopides. Bull. Ann. Soc. Ent. Belg. **87**: 82–89. (*Aphromachaerota adusta, Metahindola tamangana, Trichophyes batangana*, genera & spp. n.; *Neurohindola* gen. n.; *Conmachaerota bakeri, C. carinata, Parahindola pahangana* spp. n.)

———— 1955. Description de nouveaux Cercopides africains. Rev. Zool. Bot. Afr. **51**: 406–8, 5 figs. (*Hindola fasciata* sp. n.)

Liu, Gaines K. C. 1942. On a new species of Homoptera from Kiangsu. Notes Ent. Chinoise **9**: 5–7, 1 pl. (*Neuromachaerota becquarti* sp. n.)

Maa, Tsing C. 1947. A critical review of Chinese Machaerotidae (Insecta: Homoptera: Cercopoidea). Tech. Bull. Taiwan Agric. Res. Inst. **1**: 1–28, 2 pls. (*Conmachaerota coronata, Machaerota fukienicola, Hindoloides trilineata* spp. n.; *H. bipunctata* varr. n. *diluta* & *scutellata.*)

———— 1949. On some Machaerotinae from southeastern Asia (Homoptera). Treubia **20**: 11–24, 8 figs. (*Eumachaerota foveata, Machaerota lieftincki, M. exaggerata* spp. n.)

———— 1956. Notes on Philippine and other Asiatic Machaerotinae (Homoptera). Philipp. Jour. Sci. **85**: 233–40, 2 pls. (*Machaerota virescens, M. extensa* spp. n.; key to Philippine spp.)

———— 1961. Remarks on the distribution of the Machaerotidae (Hemiptera: Cercopoidea). Pacific Ins. Monogr. **2**: 95–100, 2 figs.

Maki, M. 1914. "A new shell-forming froghopper" (In Japanese). Ins. Wld. **18**: 354–59, pl. 17. (*Makiptyelus dimorphus* gen. & sp. n.)

Mathew, A. P. 1956. Observations on the post-embryonic development of *Machaerota noctua* Distant 1916 (Insecta: Homoptera: Cercopidae). Jour. Bombay Nat. Hist. Soc. **53**: 357–61, 1 pl.

Matsumura, Shonen. 1940. New species and genera of Cercopoidea in Japan, Korea and Formosa, with a list of known species. Jour. Fac. Agric. Hokkaido Univ. **45**: 35–82, 3 pls. (*Asichaerota taiheisana* gen. & sp. n.; *Makiptyelus* gen. n.)

———— 1942. New species and new genera of Palaearctic superfamily Cercopoidea with a tabular key to the classification. Ins. Matsum. **16**: 44–70 & 71–106. (*Taihorina tomon* sp. n.)

Melichar, Leopold. 1903. Homopteren-Fauna von Ceylon: i-iv & 1–248, 6 pls. Budapest. (*Machaeropsis valida* gen. & sp. n.)

Metcalf, Zeno P. 1952. New names in the Homoptera. Jour. Washington Acad. Sci. **42**: 226–31. (*Soamachaerota* n. n. for *Soa* Jacobi).

———— 1960. Machaerotidae. Gen. Cat. Homopt. **7** (1): i-vi & 1–49.

Metcalf, Z. P. & George Horton. 1934. The Cercopoidea (Homoptera) of China. Lingnan Sci. Jour. **13**: 367–429, pls. 37–43, 2 figs. (*Conmachaerota "notoceras"*, ♂ genitalia figured).

Ratte, F. 1884. On the larvae and larval cases of some Australian Aphrophoridae. Proc. Linn. Soc. N. S. Wales **9**: 1164–69, pls. 69–70.

Schmidt, Edmund. 1907. Monographie der Subfamilie Machaerotinae Stål, eine Beitrag zur Kenntnis der Cercopiden. Stettin. Ent. Ztg. **68**: 165–200, 8 figs. (Enderleiniini, Maxudeini, Sigmasomini, Machaerotini tribes n.; *Enderleinia bispina*, *Apomachaerota reticulata*, *Pachymachaerota nigrifrons*, *Maxudea crassiventris*, *Grypomachaerota turbinata* genera & spp. n.; *Machaerota luzonensis*, *M. notoceras* spp. n.; *M. ensiferina* n. n. for *ensifera* Sign., *Pachymachaerota signoreti* n. n. for *pugionata* Sign.; keys to tribes, genera & spp.)

———— 1912. Zur Kenntnis aussereuropäischer Cercopiden (Hemiptera-Homoptera). *op. cit.* **72**: 165–78, 2 figs. (*Modiglianiella sumatrensis*, *Neuromachaerota vosseleri* genera & spp. n.)

———— 1919. Neue Gattungen und Arten der Subfamilie Machaerotinae Stål, eine Beitrag zur Kenntnis der Cercopiden (Rhynchota Homoptera). *op. cit.* **79**: 366–73. (Date of publication: July 1, 1919; not 1918 as generally cited). (*Polytrichophyes* gen. n.; *Chaetophyes bicolor*, *Ch. unicolor*, *Platymachaerota elevata*, *Conmachaerota discreta*, *Conm. brunnipes* genera & spp. n.)

———— 1924. Neue Zikaden-Gattungen und Arten. Ent. Mitt. **13**: 285–97. (*Enderleinia fumipennis* sp. n.)

———— 1928. Die Zikaden des Buitenzorger Museums (Hemipt. Homopt.) Treubia **10**: 107–44. (*Eumachaerota siebersi* gen. & sp. n.)

Schumacher, F. 1918. Der gegenwärtige Stand unserer Kenntnis von der Homopteren-Fauna der Insel Formosa unter besonderer Berücksichtigung von Sauter'schen Material. Mitt. Mus. Berlin **8**: 71–134. (*Taihorina geisha* gen. & sp. n.)

Signoret, Victor. 1879. Description de quelques espèces nouvelles ou peu connues d'Hemiptères se rapportant au genre *Machaerota* Burmeister. Ann. Soc. Ent. France ser. 5, **9** Bull. Seances: xlviii-xlix. (5 spp. described; *punctulata*, *spangbergii*, *punctatonervosa* spp. n.)

Spångberg, Jacob. 1877. Homoptera nova vel minus cognita descripsit. Öfv. Svenska Vet.-Ak. Förh. **34** (9): 3–14. (*Carystus reticulatus*, *C. stålii*, *C. sorurculus*, *C. mutabilis* spp. n.)

Stål, Carl. 1854. Nya Hemiptera. Öfv. Svenska Vet.-Ak. Förh. **11** (8): 231–55. (*Ptyelus viridicans* sp. n.)

———— 1855. Hemiptera fran Kafferlandet. *op. cit.* **12**: 89–100. (*Ptyelus hyalinipennis* sp. n.)

———————1862. Novae vel minus cognitae Homopterorum formae et species. Berlin. Ent. Zschr. **6**: 303–15. (*Carystus* gen. n.)

——————— 1865. Homoptera nova vel minus cognita. Öfv. Svenska Vet.-Ak. Förh. **22**: 145–65. (*Machaerota pugionata* sp. n.)

——————— 1866. Hemiptera Homoptera Latr. Hemiptera Africana **4**: 1–276, pl. 1. (*Ptyelus hyalinopterus* nom. emend. pro *P. hyalinipennis*.)

——————— 1870. Hemiptera insularum Philippinarum. Bidrag till Philippinska öarnes Hemiptera-fauna. Öfv. Svenska Vet.-Ak. Förh. **27**: 607–776, pls. 7–9.

Walker, Francis. 1851. List of the specimens of homopterous insects in the collection of the British Museum **3**: 637–907. (*Aphrophora compacta, A. bifrons, Lepyronia australiae* spp. n.)

——————— 1858. Ditto. Supplement and Addenda: 1–369. (*Aphrophora admittens, A. semiflava, A. areolata* spp. n.)

——————— 1868. Catalogue of homopterous insects collected in the Indian Archipelago by Mr. A. R. Wallace, with descriptions of new species. Jour. Linn. Soc. Lond., Zool. **10**: 82–193, pl. 3. (*Narnia rastrata* gen. & sp. n.)

Westwood, John O. 1886. Notice of a tube-making homopterous insect from Ceylon. Trans. Ent. Soc. Lond. **1886**: 329–33, pl. 8. (*Machaerota guttigera* sp. n.)

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